ROCKS and MINERALS

PUBLISHED MONTHLY

Edited and Published by
PETER ZODAC

March - April
1949

Contents for March-April, 1949

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ROCKS and MINERALS PEEKSKILL, N. Y., U. S. A.

The official Journal of the Rocks and Minerals Association

CHIPS FROM THE QUARRY

COMING EVENTS

6th Annual Convention
National Speleological Society
(Cave Explorers)
April 1-3, 1949
Dodge Hotel
20 E. Street, N.W., Washington, D. C.
(Wm. J. Foster, Con. Comm., 3730 N. Glebe Rd., Arlington, Va.)

14th Annual Conclave
American Gem Society
April 3-5, 1949
Hotel Statler, Boston, Mass.

Imperial Valley Show
April 16-17, 1949
Junior College Auditorium, El Centro, Calif.
(Imperial Valley Gem & Mineral Society and Imperial Valley Guild)

Annual Federation Convention
California and American Federation of Mineralogical Societies.
June 24-26, 1949
Machinery Bldg., Calif. State Fair Grounds, Sacramento, Calif.
Leo G. Chaussee,
Chairman Publicity and Advertising,
3461 - 2nd Ave..
Sacramento, Calif.

Annual Mineral Show
State Mineral Society of Texas
April 23-24, 1949
Plaza Hotel, San Antonio, Texas.
(J. J. Brown, Pres., 302 Walton Bldg., Austin 11, Texas).

The show will be held on the roof garden which is a very large, well lighted and most beautiful room, well suited for a mineral show.

The society has made arrangements, with the manager of the Plaza Hotel, to pay a flat rate per day for the use of the roof garden and tables (which will be furnished by the hotel). The size of a table is 30" x 72". There will be no charge for anyone who may wish to display or sell minerals, lapidary equipment or supplies, etc. For further information contact Mr. Brown.

Appreciates Our Efforts!

Editor R & M:-

Just received notice of expiration of my subscription and am enclosing $3.00 for same. Wouldn't want to miss an issue as I enjoy *Rocks and Minerals* very much and really appreciate your efforts to give us a fine magazine.

Verne A. Simons,
Jonesboro, Ind.

Jan. 31, 1949

Glad To Hear It!

Editor R & M:-

I am pleased to renew my subscription for another year and my check for $3.00 is enclosed. You have really been a friend to the Georgia Mineral Society and I want you to know that we appreciate it.

S. C. Knox,
Atlanta, Ga.

Nov. 25, 1948.

WORLD'S DEEPEST BOREHOLE GOES DEEPER

Bakersfield, Feb. 15. (AP)—what Superior Oil Co. contends is the deepest well in the world is still going deeper today.

The company's wildcat well near Saticoy in Ventura county, Calif. was 17,926 feet down yesterday, with drilling proceeding at the rate of 70 to 80 feet a day.

R. Fowler, petroleum engineer for the firm, said the previous record depth for an oil well was 17,823 feet. The well, also drilled by Superior Oil Co., is in Caddo county, Okla. (See *Rocks and Minerals* Oct. 1947. p. 936).

—San Francisco Chronicle, Feb. 15, 1949.

Rocks and Minerals is indebted to Victor H. Larson, of Petaluma, Calif. for the information on the above borehole. We hope he will keep us informed on the progress made by the well and especially anxious are we to learn the final depth when the hole is completed.

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COLOR PHOTOGRAPHY OF MINERALS

By LLOYD W. FISHER
Department of Geology
Bates College, Lewiston, Maine

FOREWORD:—The writer had two specific purposes in mind when he began to experiment with the photography of minerals in natural color. First, as a class room teacher in geology and mineralogy, minerals were used as examples in the introductory lectures. Many specimens were large. Some were small. Students in front row seats could see most of the details on the larger specimens and a few details on smaller specimens. Students in the back rows could see little or nothing of either size specimen. First impressions are lasting impressions and if students are to enjoy a study of minerals and rocks good to excellent illustrations must be used. After lecture room work these same students studied hand specimens of the minerals in the laboratory. Ability to recognize minerals in the laboratory is normally accomplished more easily if the student has seen good, representative specimens in the lecture room. The second purpose had to do with showing minerals and rocks to outside audiences. It is a much more simple matter to carry 100 two inch by two inch natural color slides than to carry one or two good sized attractive mineral specimens. Therefore, with the idea of presenting in better form the subject matter of mineralogy to students and to layman alike, it was deemed advisable to photograph in color. This paper discusses the apparatus used in both the experimental and final stages and some of the pitfalls that the beginner will encounter.

EQUIPMENT REQUIRED

Most mineral enthusiasts who are also camera enthusiasts have available most of the equipment that is necessary for photography in color both indoors and out-of-doors. Equipment that is lacking can either be purchased at reasonable rates or can be improvised.

Dark Room:—A dark room should be used for all color photography indoors. The writer has attempted color photography of minerals in his laboratory where there are sky lights. The passage of clouds, with momentary obscuration of the sun, makes it difficult to work steadily with a minimum of time. In a dark room or in a room in your home in the evening, lighting can be controlled and standardized. The dark room must be of ample size to allow free working space. It should be at least five feet wide and nine feet long. The dark-room ought to be fully ventilated.

Type of Camera:—Any camera with a lens that offers excellent definition can be used but it is best to use a camera with a ground glass focusing back or a camera of the reflex type. Standard type cameras without these features can also be used, as will be pointed out later, but it is important that one is able to see the object being photographed and to ascertain how that object will appear in the final picture.

The department of geology at Bates has used two kinds of cameras in mineral and rock photography. The camera used most is an Avus Voigtlander, with a 4.5 Skopar anastigmat lens mounted in a compur shutter. Focus is 13.5 centimeters or approximately 5.4 inches. This lens opens up to f4.5 and closes down to f25. It has speeds of 1 second to 1/200 seconds. The camera is a 3¼ by 4¼ film pack and plate camera. If one does not need to bother about expense, color plates and cut color film can be obtained in this size, but such film would need to be mounted

in large sized lantern slides which are cumbersome and weighty. A Recomar back was purchased for this film pack camera. This auxiliary back uses the 828 size of film—the bantam film—which can be mounted in 2 x 2 slides for projection. The Avus Voigtlander has a double bellows extension which makes the use of auxiliary lens unnecessary.

A Pilot 6, a reflex type of camera, has also been used. This camera operates on the same general principle as a Graflex camera—a focusing ground glass being thrown in or out by means of a small lever arm. The Pilot is designed for use of 120 size film and takes 16 pictures on that size. An Essenkay adaptor can be purchased for this camera which will allow use of 828 film.

If the camera that the photographer is going to use is not of the reflex type and does not have a ground glass focusing screen, it can be used after some degree of experimentation which will be discussed later. For the newer and smaller cameras that use 135 film an excellent article "Ultra closeups with Portra lenses and an improvised focusing technique" is available at all Eastman Kodak stores. Therefore, if you have any kind of camera you can take color pictures of minerals and rocks.

Auxiliary Lenses:—If the camera is equipped with ground glass focusing and if the focal distance of the camera is of such order as to prevent proper size pictures of specimens, auxiliary lenses may become a necessary part of the equipment. This is especially true of type of cameras that use 135 film in most cases.

Camera Stand:—For the best photography of mineral and rock specimens where the greatest amount of detail is required a rigid camera stand of some type is an absolute necessity. Stopping down the lens to the smallest opening will often require a time exposure and such exposures cannot be made successfully if the camera is held in hand. A durable tripod is best. If the work is being done indoors it is advisable to make a "floorplate" for the tripod so that the legs do not slip at the most inopportune time. Such a plate can be made by using plywood and screwing "stop-pieces" in three positions on the plywood for the legs of the tripod to rest against. A Solar Copying stand can also be used if one is available. This is especially useful if one is working in a dark-room that is equipped with such a stand.

Lighting:—In all of the department's indoor work on minerals and rocks, 3 number 2 photoflood lamps are used. (PRECAUTION:—If you work in a dark room with artificial light you must use all artificial light and not mix daylight with it.) Figure 1 is a ground plan sketch of the set-up. Two of the lamps, PFL, are arranged in the conventional indoor lighting manner at a distance from the specimen that is not greater than the distance between the camera and the specimen. These two lamps are mounted at 45 degrees to the specimen's axis. Each of the lamps is screened by a spun glass diffusing screen, SGD, which gives better distribution of light. A third photoflood lamp is placed directly under the camera with its axis in line with the direction between the the camera and the specimen. This lamp, PFL_2, is used in focusing the specimen. (The other two photofloods are not used in the focusing.) PFL_2 is operated by a pushbutton. The other two photoflood lamps are connected to the house current through a footswitch-FS.

Light Meter:—Color film does not have the latitude of black and white film and therefore, exposures must be made carefully. A light meter is a necessity. Any dependable light meter may be used. A Weston Master is in use in the department chiefly because the graduation of light value in reduced lighting can be determined very easily. When a light value reading is taken ALL of the Photofloods in figure 1 are illuminated. The meter is held within 2" of the specimen in such manner so that it will not shade the specimen. If there is a variety of color in the specimen, several readings are taken and the average of these readings is used. The writer has found by experience that using one stop LARGER than the in-

dicated stop on the meter will render the transparency a bit thinner and therefore better for projection work. Each person will have to work this latter factor out for himself with his own camera.

Stand For Specimens:—In Figure 1, T is the stand for the epecimen, S. In this particular figure it is in position for proper focus with the camera in use. The stand ought to be of sufficient height so that the camera on the tripod or on the copying stand is close to eye level distance. The table for specimens that has been used is an ordinary small table on which a small box is mounted. Several books of varying thickness are kept handy in order to accommodate minerals of varying heights.

A supply of plastic clay is essential, figure 3c, in order to hold erect specimens that have an uneven undersurface.

Background Screen:—*BS* in figure 1 represents a background screen which may be a large piece of plywood or a large piece of heavy ply cardboard on which can be tacked variously colored cardboard or cloth backgrounds. A word about backgrounds is appropriate. The writer first used a piece of neutral gray monk's cloth as a background. It was fastened onto the plywood and then brought forward over the box on which the specimen rested. The cloth happened to be too close to the specimen so that when the picture was completed the weave of the cloth was in sharp focus and detracted much from the mineral pictures. To obviate this difficulty of weave patterns the writer now uses variously colored matte paper—dark blue, gray, black—to fur-

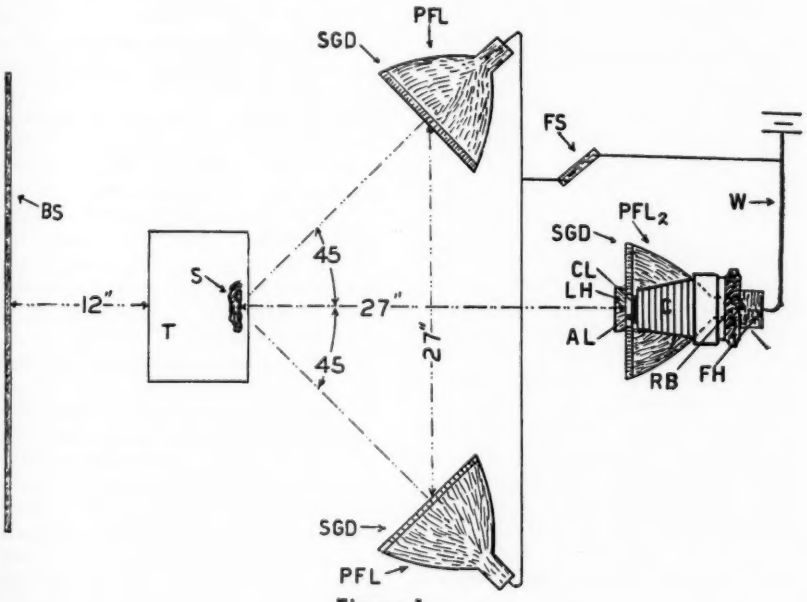


Figure 1

Ground plan of arrangement in dark room, Bates College, for Photography of mineral and rock specimens in black and white and in natural color.
AL—Auxiliary lens; BS—Background screen; CL—Camera Lens; LH—Lens Hood; FH—Focusing Hood; FS—Foot switch; PFL—#2 Photoflood lamps with reflectors; PFL_2—Photoflood lamp with reflector beneath the camera (used for focusing and for photographing-; RB—Recomar back to convert film pack camera to use 828 film; S—Specimen; SGD—Spun glass diffusing screen; T—Table for specimens; W—Wiring.

nish sufficient range for most color photography.

The size of the shadow cast by the specimen will vary and oft-times it becomes an objectionable feature in the finished transparency, figure 3, a and b. If a sufficiently narrow specimen stand is used and if the background is moved about 12" or 18" from the specimen, no shadows will appear in the finished picture.

It has been suggested to the writer the use of another type of background where translucent colored gelatin screens, similar to those used in floodlighting stages, are used. These can be made easily by mounting a 50 watt mazda lamp in a box. A colored gelatin screen can be placed against the open side of the box. The mineral specimen is set up with this screen as a background with the precaution that the mineral entirely hides the mazda bulb. Foreground lighting is the same as previously described.

Scales For Size:—Few photographs, black and white or color, outdoor or indoor, convey much to the observer unless there is some sort of scale for size on the photograph. This is important in projecting mineral transparencies on the lecture screen for size is important. Outdoors it is a simple matter to place a geology hammer, a compass, a pencil on an outcrop, or, if a view is being taken in a quarry, several persons can be photographed in some position where they will not be the key point in the picture.

Figure 3c, an octahedral cleavage of purple fluorite was photographed without using any size scale. The beryl crystal, figure 3e, shows a copper penny at the lower left hand corner. Every one knows the size—the physical size—of a penny and it can serve a very useful purpose by being placed inconspicuously in the field of view. If an extremely large specimen is being photographed, a 12" ruler can be placed with the specimen but both specimen and ruler must be in exact focus.

Choice Of Films:—The choice of films depends on the photographer and the kind of camera being used. The writer has used almost exclusively the bantam type color film, although 120 color film has been used in the Pilot 6.

Film size 828 has a distinct advantage insofar as the writer is concerned. It carries only eight exposures and therefore one roll can be finished quickly and sent away for processing. Film size 135 requires 20 or 22 exposures. If, however, one wants to experiment with 135 film it would be well to wait until say three or four exposures remain and make the experimentation then. Cut film, 3¼ by 4¼ is available, but since most amateur photographers do not process their own color film this size also has its disadvantages.

Since all of the work of the writer has been in the dark-room, the artificial type, or A type, is required if no difficulties are to be encountered.

Filters:—The case might arise where some photographers of minerals might not expose a complete roll in the dark room but want to use the remainder of the roll out-of-doors. If artificial film is in the camera it can be used out-of-doors successfully, provided the proper filter is used and the proper film speed rating is set on the light meter. The same is true of natural light film which can be used with artificial light if the proper filter is used. An example of the interchange of these films will be cited later.

Notebooks:—A notebook is important for recording data on your work. Record all important data. Keep a record of:—exposures, specimen photographed, distance of specimen from camera, use of portra lens or not, kind and number of photo-flood lamps; light value on specimen; time and stop indicated; time and stop used. The department now has complete records on about 200 natural color transparencies of minerals and rocks and resorts to these records before other exposures are made. At times it has been possible, with pronounced success, to photograph with our set-up without using a light meter. If complete records are kept, little valuable time will be used when you set up for more pictures, es-

pecially if these setups are removed from each other by several weeks or months.

Criticism:—Criticism is really part of equipment. All of us learn by experience, by the trial and error method. Each photographer is a proud photographer and is seldom an efficient critic of his own work. If you spend the money required for color film you want the best results and if you are not obtaining the best results you like to know the reason. You can always obtain sincere, honest, and helpful criticism and suggestion from the film companies. When you mail in your first film of color transparencies of minerals send the film with a letter attached to the Director of the Film Processing Service of the company. Tell him what you are doing. Ask him for a critical study of your results. You will save money if you do this and follow the advice that you obtain.

PROCEDURE FOR PHOTOGRAPHY

An endeavor is made here to point out proper procedural steps in their right sequence on the basis of lessons learned during the experimental stages. Most of the information contained herein is applicable to black and white or color and to indoor or outdoor photography.

The Field Of View:—The distance at which you work, the focal distance of your lens, and several other camera factors determine largely the field of view. In closeup work of photographing minerals, whether the film be black and white or color, it is best to prepare a "field of view" table for your own use with your own camera. Such a table will save considerable time later.

Field Of View With Focusing Back:—Set the camera up on a tripod or on any secure stand. Suspend a yardstick at some distance from the camera. Open the lens wide. View the yardstick through the ground glass. Observe the number of inches of the yardstick that you can see on the ground glass. Note now the distance between the camera lens and the yardstick. Move the camera closer to, or more distant from, the yardstick and make the same observation and notes. After you have taken several readings of "width of field" and "distance from camera" you can prepare for your own camera a table such as shown in figure 2 (prepared for the Avus Voigtlander, f.14.5 cm.).

Suppose you are using a camera without a ground glass viewing screen. Load your camera with black and white film. Take two yard sticks placed at right angles to each other at 18". Use the extension bellows as marked and take say 4 snaps from different positions, noting the positions used. Attach portra lenses of different strength. Follow the directions given with each of the portra lens. Make several exposures and keep notes of distance. When the film is returned to you processed, or when the exposures have been printed, you will know the field of view for each distance used. You can then prepare a table and use it without the necessary experimentation again.

If the back of your camera is removable you can make the table without using a film. Secure a small piece of tracing cloth. Stretch it tightly over the open back of the camera. This will now serve as a focusing glass. Use the yardsticks again and compute the relationship between width of field and the distance between camera and subject.

After you have determined the field of view and are ready to take some pictures, ararnge the mineral or rock specimens in order of increasing or decreasing size. Measure the greatest dimension of the specimen. Add about 2 inches for a safety factor. By means of your table calculate the working distance. Set up at that distance and you are ready for work. If you do not arrange your specimens according to size there will be a large amount of necessary shifting of tripod and camera.

EXPERIMENTAL "SHOTS" AND RESULTS

Determination Of Exposure And Opening:—The first color transparencies of minerals attempted in the department were purely experimental. Three specimens sodalite, lavender blue in color; cancrinite, lemon yellow in color; and kröhnkite, azure blue, were used in one set-up. The distance between camera and

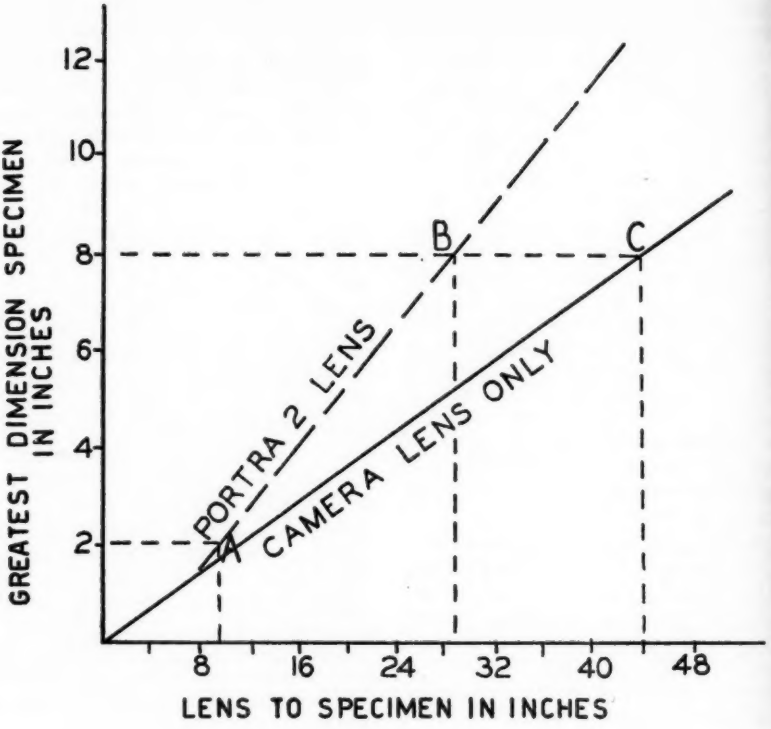


Figure 2

Curve for lens-to-specimen distance.

the center of the middle specimen was 39". At this distance the specimens had to be within a space of 7½ linear inches. (Figure 2.) The specimens were focused by turning on PFL_2 and were focussed most accurately. A penny was placed in the field for size. The light meter was held within one and one-half inches of each of three specimens and the average reading of 25 was used on the light meter. This gave an indicated f.16 with one second exposure. Three different exposures were made for comparison, the first, one second f.16, the second, one second, f.12; and, the third f.22 and one second. These data were all recorded. The next test was with calcite, a group of crystals from Joplin, Missouri, and quartz, an aggregate from Hot Springs, Arkansas. The light value was 13 which indicated f.11 at one second. The first exposure was made at f.14, one second, the second exposure at f.11, one second, and the third exposure, f.8 and one second. The final two exposures on this roll of eight was a specimen of granite and a specimen of rhyolite. Light values varied from 19½ to 35, and the average of 27 was used. This is how the notes were recorded and the criticism of the film processing director appended.

Roll #1K826A.—working distance, 39", 1-s. 3 PFL-#2.

Exposure	Light value	Indicated	Used	Notations
#1	25	1 sec. f.16	1 sec. f.16	excellent, good focus
#2	"	"	1 sec. f.12	overexposed, too thin
#3	"	"	1 sec. f.22	underexposed, too thick
#4	13	1 sec. f.11	1 sec. f.14	fair but a bit underexposed
#5	"	"	1 sec. f.11	good, nearly proper exposure
#6	"	"	1 sec. f. 8	fair, not as good as #5
#7	19½—35	1 sec. f.18	1 sec. f.18	good—both about right
#8	"	1 sec. f.18	1 sec. f.16	good—rhyolite a bit off

If such notes are kept each person will soon accumulate data which will enable him to work more smoothly and will allow less chance for error. These experiments 1, 2, 3, on sodalite, cancrinite and kröhnkite gave us some information with regard to photographing three different colors at the same time; 4, 5, and 6, for depth of focus; and 7 and 8, for slight differences in color and grain size.

If further experimentation is desired on photographing more than one color at a time the experimenter is advised to use a polished agate in which grays, reds, browns, yellows, blues, etc., are found. Try three different openings, keeping the time the same.

Effects Of Luster:—Luster is the manner in which minerals reflect light. Most minerals can be cataloged as either metallic or non-metallic. If one wants to experiment with effect of luster and the resulting reflection of light, a bright brassy pyrite specimen is excellent, or, a dull bronzy pyrrhotite, or, a gleaming blue white luster of galena. On the non-metallic side, the writer experimented with lustrous black hornblende and dull grayish green pyroxene in the same picture. The hornblende gave a light value of 25 and pyroxene a value of 13½. Light value 19, about midway between the extremes, was used with excellent results.

Minerals Of Different Color:—A brief tabulation is made of some information obtained in photographing each of the minerals listed on separate exposures. These exposures might serve as an experimental guide.

	Light value	Seconds	Stop
GROSSULARITE (brown garnet)	37½	1	18
ALMANDITE (red garnet)	32	1	17
BIOTITE (lustrous	25	1	16
PYRITE (brassy, brilliant)	37½	1	20
MALACHITE-AZURITE	19½	1	14

The above used shutter speeds and opcnings gave excellent results.

Labradorite:—The chatoyancy of labradorite can be captured in full color and shown to a lecture group. The labradorite studied was turned gradually until delicate blues, bronzes and golds could be seen in the focusing glass. The indicated stop and speed was used and the picture was excellent.

DON'T

A few precautions that may cost money if not observed are added to this paper in an effort to aid others.

1. Focus with one photoflood lamp. You save electricity and you don't heat up the dark room so rapidly. But DON'T forget to use the three lamps when taking the transparency.

2. Make certain that you know the type of film that is in your camera. The writer consumed 2 hours of time photographing eight specimens of black, green, blue, pink tourmaline, on K828. It was sent off to be processed, and returned with the notation. "You used ordinary light film under artificial light conditions with the

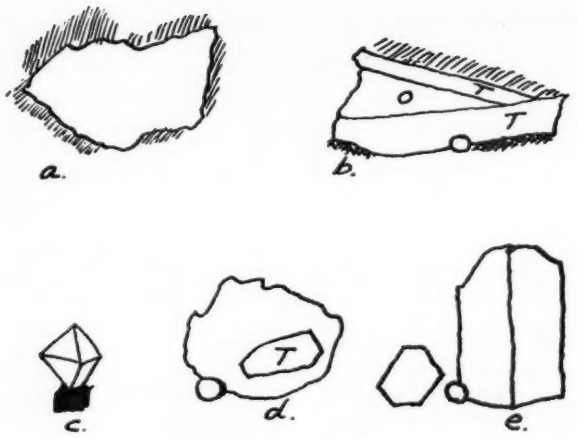


Figure 3

Outlines of minerals drawn by superimposition over finished transparencies all of which are same scale.

- **a. Distracting shadow around a pyrite specimen.**
- **b. Distracting shadow around upper edge of tourmaline crystal. O—Orthoclase; T—Tourmaline (Schorl-.**
- **c. Fluorite Cleavage Octahedron. A size ratio should havd been used.**
- **d. Copper penny, lower left, gives idea of side of T—opaque green tourmaline.**
- **e. Copper penny gives idea of size of basal plate of beryl crystal and of large prismatic form.**

film rating for artificial light." DON'T use natural light film with artificial light unless you use the proper filter and the proper film speed value.

3. DON'T attempt to photograph two minerals and rocks of distinctly different colors. The writer is still attempting to picture on one transparency a red, fossiliferous hematite from Clinton, New York, and a black specular hematite. The reflected light value from each specimen is so different that a good transparency is difficult to obtain.

4. DON'T HURRY with your work. Color film costs money and so does your time.

5. DON'T have too many variables in your photography. Try to work with a fixed distance, a fixed number of photoflood lamps, a fixed time. Vary the stops on your camera. The fewer variables the less apt one is to forget to make some adjustment.

A PLEA

Many mineral collectors carry cameras with them on their field trips. Many mineral collectors make notations about the minerals they find. These notes describe the locality, the type of rock, the emplacement of the mineral, the characteristics of the mineral. Supplement your field notes with pictures. Use the same information contained in this paper for outdoor work using outdoor film or indoor film with the proper filter and proper light value ratings. Place some suitable measuring object on the outcrop and photograph before you remove the mineral or the rock.

A GOOD PHOTOGRAPH SPEAKS LOUDER AND MORE CLEARLY THAN WORDS.

TRIP TO AGATE, NEBR.

By MRS. NICK MUELLER
Washougal, Wash.

Last summer, while on a collecting trip to Agate, Nebr., I carried with me my R&MA membership card, never thinking I might find it of any use. On reaching Agate, we stopped to inquire about its agate beds and the geologist in charge informed me that only responsible people were allowed to visit them because some damage had been done to many good specimens by "greenhorns". The prospect of visiting the beds looked rather dark until I brought out my membership card. He glanced at it. Then you should have seen the difference in his attitude! Why, yes, we were welcome to go there and to keep what we may find. He not only gave us directions for reaching the fossil beds but also the nearby agate beds and in addition gave us some nice specimens from his collection.

A museum is in Agate of which the geologist was in charge but it was closed due to the fact he had to meet a plane coming in from Washington, D. C., his time for talking with us was therefore limited.

We reached the fossil area without trouble where we took a few pictures of the cliffs and collected a few petrified bones of the extinct three-toed horse; one nice toe specimen had a crystallized interior. We were at the fossil locality for about an hour (this was our first fossil hunt) then we went on to the agate beds where we collected a few nice moss agates. Here our children (2 girls and a boy) soon ran onto a rattlesnake curled up under a rock which ended our visit very abruptly, as we were not prepared for snakes. No damage was done, however, and as it was a sizzling hot day, we were glad to call it a day.

On the way home we stopped off at Kemmerer, Wyo., to collect at the fossil fish locality. It was a long hike from the car to the cliffs (fossil locality) where the slope was covered with loose rock and very steep. Neverthless, we felt that our efforts were not in vain as we found two nice specimens; one was a small fossil fish in shale and the other a large vertebra bone fossil

On arriving home, I cut some of the Nebraska moss agates which turned out to be very nice as they took a good polish. Most of the material is clear with tiny lines and dots of black moss very thickly scattered through it.

Someday I may write more about other trips we have taken throughout the western states collecting agates for my shop and minerals for my collection.

My ambition is a school museum for the children in our town. The teachers here are very interested in the idea. I have given lectures and travelogues and furnished displays for different clubs and groups in our town.

A Fine Job With R & M

Editor R & M:-

Enclosed is my renewal check for 1949.

I wish to repeat what I have said before that I think the separation of the advertising matter and the reading matter in *Rocks and Minerals* serves both parts much better than having them all mixed up. I can find information on things I want to buy far more quickly in *Rocks and Minerals* than in any other magazine I subscribe for. This is because the advertisements are all in one place and in addition you publish an excellent directory to the advertisements. When advertisements and reading matter are all mixed up, I think many ads are overlooked as one reads the articles, unless he takes his mind off what he is reading and this breaks the continuity of reading the articles.

I want to particularly compliment you on the fine articles written by Ronald L. Ives, especially those dealing wth geology in the Dugway region in north-west Utah. I am well acquainted with this region and Mr. Ives has written accurately about it. His other articles are excellent also.

You have done a fine job with the magazine over the many years it has been published when everything is taken into account. You have had some nasty problems with prices, printers, etc. but you seem determined not to get licked and we all admire you for it, and we will support you, too.

Junius J. Hayes,
Salt Lake City, Utah.

Dec. 9, 1948.

ROCK-HUNTING INCREASES ENJOYMENT OF LIFE

By HELEN KENNEDY

Member of Humboldt Park Lapidary Shop, Chicago, Illinois

They say travel broadens one and so too does rock-hunting. The two are of necessity wedded at times. You cannot really hunt for rocks unless you also do some traveling, no matter whether the rocks are close at hand or across the continent. If you do have rocks close at hand, you still develop a hankering sooner or later to look in other and perhaps greener fields. When hunting for rocks, you are more deeply made aware of new interests, new people, new horizons. But of equal importance, it assuages and at the same time further intensifies a great natural curiosity that most true rockhounds have; an endless quest for the why, how, where and when. Your search for rocks brings you closer to Nature and therefore God, who created this wonderful world.

Being an amateur grinder of gemstones for one whole year, it was inevitable that vague longings to go on a rock hunting trip should begin to stir. The longing crystallized into a definite plan a few weeks before the trip which did not leave much time for searching back numbers of *Rock and Minerals* and other literature for gem collecting areas. My brother brought along his new car and family. I met him in Denver, Colorado, and away we went westward on the 14th day of August, 1948.

We went west by way of Colorado Springs because we had anticipated looking for agates along US 85. Instead we switched over to Sedalia, taking Rampart Range Road to visit the Devil's Head area and look for topaz. We did not find any but this road had such magnificent views along its many hairpin turns that our disappointment soon vanished. At the end of this road we had a chance to visit the Garden of the Gods, an area of 770 acres set aside as the ancient worshipping grounds of the Ute Indians.

Gold District

Cripple Creek, Colo., was visited by way of Gold Camp Road with nine long tunnels. At times we saw the tracks of the slowest railroad in the world — Midland Terminal Railroad operating between Cripple Creek and Colorado Springs. The train of ore cars reaches the speed of eight miles an hour over the exceedingly high mountainous area even though there are five engines: one at each end and three in the middle. Back in the gold boom days during heavy shipments of gold from Cripple Creek, guards were stationed inside as well as on top of the box cars. Just recently the railway was authorized to abandon this run from Cripple Creek to Colorado Springs. Cripple Creek was the richest gold camp in the world, 50 years ago.

The slowest railroad in the world.

Its gold fields lay isolated in a tiny crater of an extinct volcano piled with immense masses of lava and granite containing dry quartz impregnated with pure gold. Many mines have long since been abandoned but we saw some that were still operating.

Turquoise Mine

Before leaving the gold district of Cripple Creek and Victor we visited a turquoise mine whose owner worked it only on week-ends and who, we were told, would not mind if we looked over his dumps, leaving the diggings untouched. Naturally we headed straight for this mine because we had been on our rock-hunting trip for two days and nary a gemstone had we found. Unknown to us, the owner was next door dismantling one of his buildings. Surely he must have been amused at our somewhat childish glee in finding even tiny bits of turquoise. None of the pieces were large but we were so thrilled! As we left the dump we were greeted by the owner and a pleasant few minutes were spent chatting about rocks. He said his mine had produced some exceptionally beautiful pieces of turquoise and showed us his prize silver bracelet set with myriads of square shaped turquoise. It was a work of art.

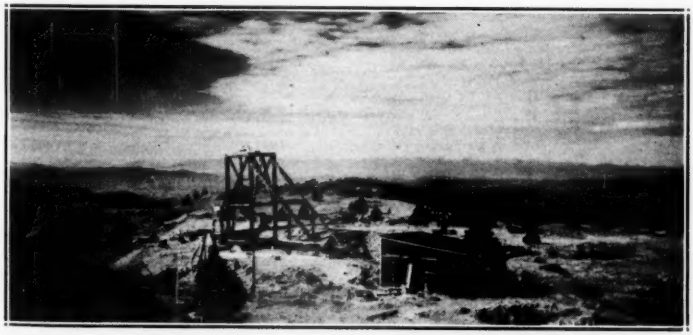
He told us of an abandoned gem mine which could be found a few miles north of Cripple Creek on Colo. 67, left side of the road. We looked but could not locate the abandoned gem mine whose weather-beaten sign was supposed to be visible from the highway. There were many other abandoned mines along the way. After looking over a few we soon left and headed for Florissant on dirt road No. 143. Some petrified forests were along this route that we could have investigated but knowing there would be others on the way we did not stop.

Leadville, Colorado

Just before Leadville, the most important silver camp in Colorado, we saw the great Arkansas Valley Smelter. The smokestacks and blackened buildings are not easily seen from the highway because of the great mounds of dump material but by night the flames from the furnace light the surrounding landscape with a weird glow. Ore from nearby mines is crushed here and carried to hearth furnaces to be roasted and treated. Abandoned mines can be seen from the highway and some weathered houses are set on steep slopes that can only be reached by long stairways from the highway. This locality is more for commercial minerals than cutting materials so we did not tarry long.

Dinosaur Beds

At Glenwood Springs, Colorado, a resort and ranching center, we relaxed in their large outdoor mineral swimming pool. The community is built around numerous hot and cold mineral springs flowing from limestone formations. Considerably refreshed, we decided to take in a scenic spot near Grand Junction, Colorado. We drove 23 miles out of our way southwest to Colorado National



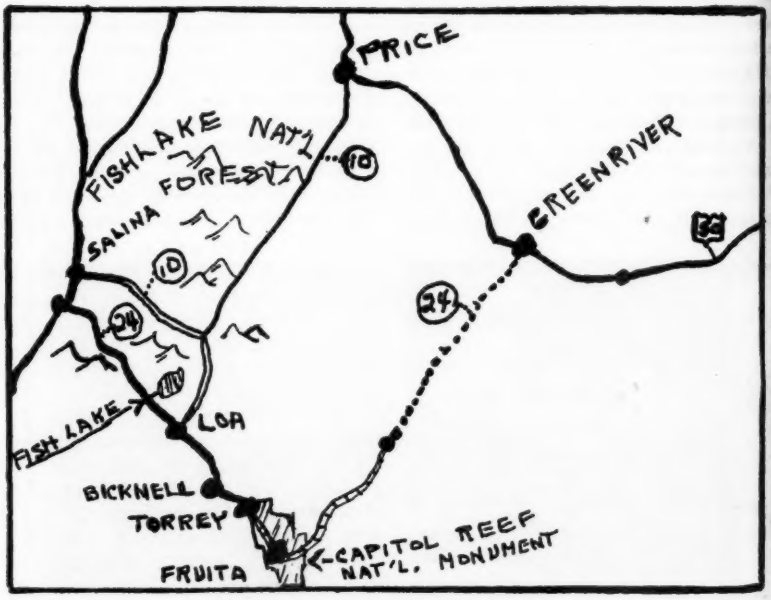
Small gold mine, as seen from Gold Camp Road.

Monument, an area of some 18,000 acres of haunting scenic beauty as well as interesting dinosaur beds filled with fossilized remains. The dinosaur beds start four miles out and extend more than 100 miles along the banks of the Colorado River. Bones and incomplete skeletons of giant prehistoric animals have been found. Petrified bamboo stalks, ferns and fossilized palm leaves have been uncovered here. The feature of this park area is Rimrock Drive, a paved highway that takes you to many points of scenic beauty in the park high above the Colorado River. We camped here that night. Next morning on our way westward and back up to US 50, we passed dinosaur beds containing fossilized pink snail shells. We did not pick up any because of space limitations back home.

Entering Utah

Leaving Colorado behind us, we entered Utah on US 50, which whisks its way to Greenriver over a region of flat baked clay and shale. The flats are baked hard in the summer sun and cracked and broken by the winter frosts. We left US 50 at Price, Utah, and branched south on State 10 towards Fishlake National Forest. We were so absorbed in the primitive beauty of this forested region, that we inadvertently took the wrong turn and drove out of our way to Salina, Utah. We backtracked from Sigurd eastward on Utah 24, an excellent paved highway right in this section, winding around forested mountains. Villages are cramped into thin strips of valley along the route .

We drove near Fish Lake, the most popular fishing area in Utah. This district around Fishlake National Forest is full of wildlife. Mountain lions are plentiful, preying on the thousands of deer in this deep forest. Ten years ago Utah had 600 bears and 550 mountain lions and panthers scattered throughout her primitive forests. After accounting for expected increases and possible decreases in animal population, that information is slightly hair-raising to an office gal roughing it for the first time and sleeping out alone on a cot. Incidentally,



Central Utah

a large male lion usually weighs 200 pounds but is far stronger than a man of equal weight. The lion can easily drag a dead horse whereas four men would be needed to drag the same horse.

The region around Teasdale, Torrey and Fruita is full of petrified wood from forests which flourished millions of years ago. Tiny branches to great trunks of petrified wood are to be found within three miles of the highway.

Fruita, Utah

Fruita on Utah 24 is a charming village with orchards, set in a pocket surrounded by the towering cliffs of Capitol Reef. This is a high plateau region of southern Utah, a region of petrified wood, prehistoric remains and deposits of jasper, chalcedony, agate and other minerals.

Residing in Fruita are several well-known persons, among them Dr. A. L. Inglesby, whose name had been given to us by a famous person especially well-known in the lapidary field. I had written to Dr. Inglesby before our trip and he was now awaiting our arrival. It was a little difficult to locate him but he was tracked down by first locating the sound of the grinding wheels in his Lapidary Shop, where he was busily working on an attractive cabochon of Variscite from his mine in Utah. On introduction, he warmly extended the glad hand of hospitality.

A distant view of part of the Cliffs of Capitol Reef.

His summer home in Fruita is referred to as "The Inglesby House" and to quote from a 1941 published book on Utah:

> "It is built of logs, petrified wood and ripple-marked sandstone. It is surrounded by a fence made entirely of great slabs of ripple-marked stone, bolted together to enclose the rich green of the garden, seeming greener than it is against the colored cliffs".

Seven years later, his house appeared exactly as pictured in this book. Inside the stone fence is an attractive lawn with beautiful flowers. Stately trees border the grounds. The unusual stone fence was the first thing that caught our eyes and we said, "This is it".

Over fifty years ago Dr. Inglesby came to Utah to establish his dental office in a roaring mining camp. As a consequence and because of his zest for living and a great natural curiosity, he soon became interested in minerals and obtained thousands of fine specimens. He has now retired from his dental practice and is devoting more time than ever to the fascinating occupation of collecting and working with minerals and gemstones, as well as exploring new areas in Utah. Even today he discovers new natural bridges, rock areas and prehistoric remains. He has a vast collection which we were happy to see, spending a whole afternoon at this absorbing pastime. In 1939 he wrote an interesting article "Mineral Collecting in Utah" which was published in the September issue of the *Mineralogist*. Dr. Inglesby is usually referred to as THE authority on the lesser known mineral areas of this section of Utah.

At the time of our visit we also met

Mr. Gordon M. Watkins who seemed to be engaged in lapidary work with Dr. Inglesby and futhering his acquaintance with minerals from this locality. He is an old-time rockhound and lapidary from Oregon and belongs to the Oregon Agate and Mineral Society of Portland as well as the Willamette Gem Cutters of Salem, Oregon, which he organized in 1947. One evening he entertained everyone assembled by showing his colored slides on southeast Utah.

Dr. Inglesby took us out one day to one of his hunting grounds for petrified wood. We branched off from Utah 24 to an unnumbered and unnamed dirt road which we followed for quite a while. We then parked our cars and went the rest of the way on foot, in this dry barren region of past volcanic activity.

The petrified wood I picked has splashes of red, orange, soft yellow, shades of green, blue streaks and also blackish streaks. Not too much grain is visible in my pieces. You can find chips small enough for few cabochons or tree trunks, either on top or slightly buried under the white sand and volcanic drift, and almost all of it is of cutting quality. The territory did not seem to be the least picked over and I was almost frantic at first trying to decide which to pick up and which to leave. They all appeared equally good to my inexperienced eye and Dr. Inglesby would urge me to leave those behind and wait until we found some really good pieces in a spot just a little further on. For my part I came back from this particular day's sojourn tired but happy, with enough petrified wood to keep me busy grinding in my leisure moments during the coming months.

We were invited to look for dinosaur bone the third day but alas we did not have the time. Also our low-slung strictly highway passenger car balked at taking the off-the-beaten trails to the rock hunting areas. However thanks to Dr. Inglesby, he generously supplied us with dinosaur bone, black and flowered obsidian, sagenite, variscite and other native gemstones. It is best to make these trips into the wilds of this part of Utah in a good old Ford truck like Dr. Inglesby's or on horses carrying plenty of drinking water and food. Some interesting trips can be taken providing of course someone in the party is familiar with this region. Because of the very nature of this vast area and its inaccessibility, the

Where we parked our cars. That's Dr. Inglesby with his back to the camera.

A tired but happy rockhound.

greater part of it will probably remain in its present and natural state for a long time to come, with who knows what unusual and beautiful gemstone material being kept intact just a little longer by old Mother Nature.

I longed to stay in Fruita for at least one week but it was not feasible for the others in my party. It would have been pleasant to have had more time to just wander around and explore this peaceful green valley, more time to go off on rock-hunting jaunts with an obliging horse perhaps . . . but there will come another time.

Several magazines have published locations of gem areas in Utah. It is possible to find many kinds of agates including flower and lace agates, chalcedony, jasper, azurite, malachite, garnet, opal, topaz and other minerals. Topaz has been mined at San Thomas Range, amethyst from the Dugway area and aquamarine from Deep Creek. Drum Mountain is said to be strewn with a variety of gem material mostly of the quartz family. East of Drum Mountain is the noted gem locality of Topaz Mountain. Both mountains are in isolated and sparsely settled parts of Utah but I, for one, shall dream of some day being able to visit and explore them also.

Capitol Reef National Monument

A scenic, scientific and historical attraction around Fruita is certain land of the Water Pocket Fold area set aside by the Government and named "Capitol Reef National Monument". The reef which gives its name to this Monument is an upthrust mass of rock with a cliff face. This great ridge of rock is about 80 miles long and stands high above its surroundings. Part of this reef, 1,000 feet high, runs directly in back of Dr. Inglesby's summer home, standing like a giant sentinel and dominating the landscape for miles. On one of my walks in this valley I saw some of the rock walls of this reef covered with petroglyphs and pictographs. No one knows definitely just what these picture writings mean and students and scientists are still working on them to find the answers. One can also find rude stone dwellings left by the now long vanished race sometimes referred to as Cliff Dwellers. These were Indians of the early Pueblo culture who suddenly vanished mysteriously from civilization, seven centuries ago.

The beautiful changing colors in certain sections of this 80 mile long reef is difficult to describe. It runs in streams and bands showing an intermingling of soft peacock blues and greens with shades of purple, orchid, reddish brown and creamy beige — somehow giving the walls a velvet appearance in certain spots. Besides for this colorful ridge of rock and prehistoric evidences, the Monument area is also noted for its erosive formations resembling temples, massive arches, goblin rocks, lofty pinnacles and deep canyons cut out by the action of wind and water.

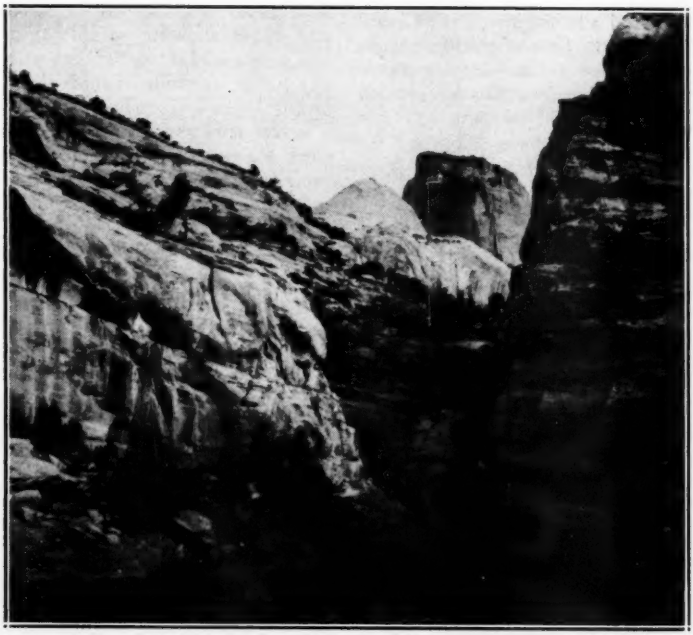
Meandering in and around the Monument area is the Fremont River, formally known as the Dirty Devil because of the ruinous floods it roaringly indulges in so often. Over a period of years it is mainly responsible for cutting out many of the washes and gorges of the Monument area. Grand Wash is an example. It is about two miles out of Fruita on a poor road to the left. A car can be driven with care down the bottom of Grand Wash into the Fremont River canyon, the most beautiful canyon in the Monument. It is bordered by red hills on one side and red and ivory tinted cliffs on the other. Standing stumps of petrified trees can be seen in this canyon. Another piece of

erosive work resulting from the cutting action of flood water is Capitol Gorge reached by Utah 24 about four miles east of Fruita. Here the road is just the bottom of the gorge and the walls rise 1,200 feet above the canyon floor, so close together in spots that two cars cannot pass. Red and cream colored sandstone cliffs line the gorge along with a great variety of pinnacles, temples and other erosive formations, all well colored. The road emerges from this gorge about thirteen miles after Fruita. August cloudbursts rushing off the rocky landscape sometimes race through these gorges and narrows, tumbling boulders that weigh tons. Desert and semi-desert plants grow plentifully in the Monument area and petrified forests that flourished millions of years ago remain as mute evidence of the past. The area north of the road from Cathedral Cliffs to Chimney Rock, about twenty-six square miles, is another section rich in petrified and fossilized remains.

Hanksville, Utah

Very early one morning we reluctantly departed from Dr. Inglesby and his green valley. Taking Utah 24 to Hanksville we passed the town of Notom, a group of ranch houses strung along the road. Between Notom and the next town of Hanksville, Utah 24 is an improved dirt road crossing a wasteland of sand dunes.

In Hanksville we visited Mrs. Edna Ekker to see her collection of agates, petrified wood and other minerals from her part of Utah. Registering at her restaurant was requested before we went further in either of two directions: north to Greenriver or south to Hite. No matter which route is taken, you are advised to fill up on gas, water, check tires



Note the size of our car on Utah 24, right in the heart of Capitol Reef National Monument a few miles east of Fruita, Utah.

etc. Large billboard prominently displayed near gas pump says:

DRIVE CAREFULLY
THIS ROAD IS SAFE WHEN DRY, AND IF DRIVEN AT REASONABLE SPEEDS NOT EXCEEDING 30 MILES PER HOUR.
CARRY AMPLE SUPPLY OF WATER - CHECK GAS AND OIL
USE LOW GEAR ON STEEP GRADES.
REDUCE TO LOW OR SECOND GEAR BEFORE DRIVING THROUGH SAND. DO NOT STOP IN SAND
SOUND HORN ON CURVES AND DUGWAYS
DO NOT PARK IN WASHES - STOP ONLY ON HIGH GROUND.

Utah 24 is a graded dirt road for the next 100 miles continuing north to Greenriver and crossing a ford with a quicksand bottom soon after Hanksville plus numerous other fords and streams. The other road did not seem to have a name or number. It is a trail leading to Hite and then Blanding. This is the route we decided to take. We were told at Hanksville that it was passable and in fact one car had gone through that day already. It was indeed a shorter route to southern Colorado but had we fully realized what was ahead for our low-slung passenger car, we would have chosen the longer way: Utah 24 to Greenriver or even State 10 to Price. Roads in this section of the country are not too plentiful. This trail was the only one cutting across Utah in a southeasterly direction, and in time as it improves and meets federal standards, it will be an important road through southeastern Utah.

The Trail

What follows about the trail is purely my own impression and does not necessarily reflect those of other travelers. Our trail unfolded southeast from Hanksville and reached across the barren desert toward a ragged, ochre tinted range of uncompromising mountains, reefs and cliffs. Shades of red permeated everything. This semi-arid desert is harrassed by wind which covers everything with a fine red dust. Even our trail is reddish brown. This was a lonely road with only one tiny settlement, Hite, halfway across to our destination: Blanding, Utah. Mile after mile of utter desolation. It eventually took thirteen hours to cover about 191 miles from Fruita to Blanding, with a few short stops here and there. No gas stations, drugstores, hamburger stands, Burma Shave Lotion ads — only glorious and awe inspiring Mother Nature herself, slightly on the dry side.

A desert is more than a dry country. It is a place where plants are few and where rains are sudden cloudbursts. For much of the year these stream beds or washes over which we drove, are dry but after heavy rainstorms they are swept by swift, roaring currents making the road impassable. There may be ten feet of water in half an hour. It may not be raining near you but the runoff from a storm miles away may catch you as it rushes down some wash. The rainy season is expected during the last of August which coincided with the time of our visit.

For the first several hours the trail gave no inkling of what was to come and rolled with deceptive and innocent smoothness toward the horizon. Then we came upon a neatly lettered sign saying: "DANGER. FLASH FLOOD AREA. 60 WASH CROSSINGS NEXT 18 MILES. DO NOT CROSS WHEN IN FLOOD." This should have given us an idea of what to expect but being Babes in the Woods, it didn't. We felt only a slight thrill of adventure. However had a desert cloudburst developed, this trail could conceivably have become quite dangerous.

We drove over dried out river beds in deep canyons that showed the effects of erosion. Where soft and hard beds of stone alternate, the soft beds were eroded leaving massive overhangs under which our car passed, caves we would have enjoyed exploring under different circumstances, alcoves, fluted columns and bridges. Large boulders weighing tons would be perched precariously along our trail, placed there by some previous flood.

The morning faded into early afternoon. We were still in the Flash Flood Area — the 18 mile stretch with the 60 wash crossings, when dark clouds began to gather and the desert wind increased

its velocity whistling through the canyon and whipping sand against the car. A few drops of rain spattered against the windshield. Now indeed we did feel apprehension, especially when we became stuck in the sand next to another neatly lettered sign warning: "SAND. DO NOT STOP. USE 2ND GEAR".

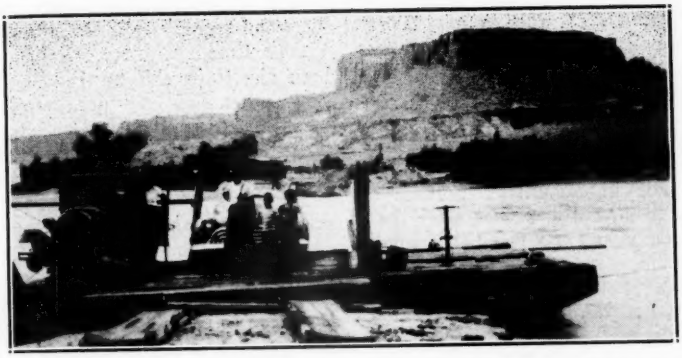
The wheels spun and sand flew as the rear end of our car settled into a deep rut. Sand came up to my ankles as my brother's wife and I stepped out to shovel it away from the wheels. We placed rocks in back of the wheels as they inched forward when my brother pressed his foot on the gas. Digging out sand faster than it sifted in was tough work for an office gal but this was adventure! I wanted to go rock-hunting, didn't I? Finally with a snort the car rolled out onto firmer ground. Our vasomotor systems relaxed and blood again flowed into the small capillaries. We were destined to get stuck in the sand once more before we were safely out of this bad section, which seemed to alternate between dry wash crossings and stretches of sand. The car's rear exhaust pipe became clogged with sand and dirt and bent by rocks as we bumped our way through the washes. For that too, we had to stop, remove the sand and dirt and straighten her out with pliers and things.

A danger sign on the road to Hite, Utah.

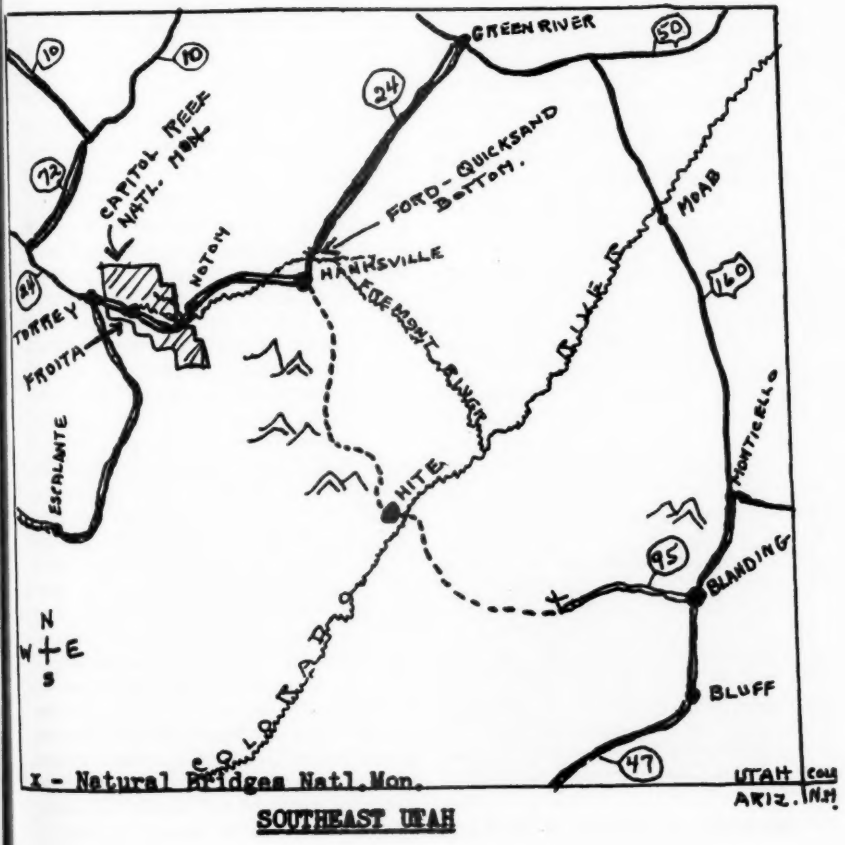
In about 100 miles and not quite so many perspiring hours we reached the tiny settlement of Hite, where we had to use the ferry to cross the Colorado River and continue on our trail. Hite is situated right on the Colorado River where the red cliffs open up and the river slows down, making a good natural crossing on the ferry we used. Dark Canyon is to the north of us in little-known canyon wilderness where red jasper can be found should anyone be interested. Here also along the Colorado River in various canyons are rude stone houses used in prehistoric times by the Cliff Dwellers.

The operator of the ferry, a handsome specimen of Utah manhood, said our trail would be improved and truly it was. It even warranted a name: State Road 95, after Natural Bridges Monument. We were relieved enough so that our thoughts channeled back to possible rock-hunting while we were passing through this vast region of disintegrating rocks. Little soil in this region, still only red sand and rocks. At the first likely looking spot we stopped for a short time and went scrambling over the pebbly hillside. We found some rather interesting pebbles. These include black basanite, yellow jasper, green plasma, gray and red chalcedony (all are varieties of quartz), and two rocks, a pinkish granite and a pinkish pegmatite. I shall cherish at least one or two polished cabochons of these as mementoes of this trail.

We met two prospectors or miners on the trail after Hite. We chatted for a short while and they showed us interesting specimens of very fine grained minerals and sandstone carrying vanadium and the bomb material, that they had encountered in their mining operations in the nearby hills. The lower eastern part of Utah, most of it a barren semi-arid region,



I jumped off ahead as we neared opposite shore to take this snap. Converted old Ford was used for power — seen on extreme left.



SOUTHEAST UTAH

seems to be a promising region for uranium minerals. The Atomic Energy Commission has already established depots at Monticello, Utah, and Durango, Colorado, while Moab, Utah, is one of the centers of mining activity for uranium. The Geiger Counters must be clicking like mad in this region.

We made an uneventful approach to Blanding. Now that we are safely past the trail, it wasn't too bad but I would not recommend it for motorists in a low-slung late model passenger car, and especially not during the flood season. Better to go the longer way and use one of Utah's improved roads. She has many excellent highways. It was quite an adventure though and I do not regret taking the trail now that we are safely back home. In fact, the trail exerts a strange fascination, since it takes you through the still mysterious land of southeast Utah. You feel — in fact you know darn well — not many have come this way and the spirit of pioneer blood stirs in you. This part of Utah has enjoyed comparative seclusion down through the ages without serious trespass by man. It is good to have such lands yet to be explored.

Back In Colorado

From Blanding we drove to Monticello, Utah, and then re-entered the State of Colorado on US 160 towards Durango. This southwestern corner of Colorado is ringed by high mountains and is sometimes cut off from other parts of the state for days during the winter months by heavy storms. Widely scattered areas here and in other parts of the state are highly mineralized. Her metallic ore deposits apparently come from deep within her bowels, forced up by volcanic activity, chemical action of vapors and rising water solutions.

Durango and Bayfield, Colorado

Knowing we would come back to Durango, we rode on towards Bayfield to see what Gem Village looks like. After reading in *Rocks and Minerals* and other publications the numerous ads of the four gem dealers now located there, we just had to see Gem Village. Bayfield is peacefully situated in a sort of valley through which the Los Pinos River flows. A quaint New England charm pervades the whole scene, as you first glimpse Gem Village from a distance. It would have been nice to be able to visit all the gem dealers but time did not permit. We therefore chose to visit Gem Exchange, since their well-illustrated easy-to-handle catalog had been clutched hotly in my hands all the way from Durango. It was marked as to what I wanted to see and possibly buy—unusual gems that I was not as yet acquainted with. Mr. and Mrs. Green pleasantly received us and gave free reign to browse around through their hundreds of drawers lining one whole wall, all marked as to contents. Among a few other things I selected a beautiful piece of topaz which has since been facetted and set in a gold mounting. It made a ring to be proud of and is another good souvenir of this trip. Mr. Green showed us some of his polished cabochons. One was an unusually large polished cabochon of moonstone from India. A beauty! He gave information on collecting areas but as it turned out we did not have the time to investigate.

Back in Durango we headed north on US 550. This section of the road is referred to as "The Million Dollar Highway" because of the gold-bearing gravels with which it is surfaced. Their value was not discovered until the road was completed. About eleven miles north on this expensive highway, we visited another gem dealer, Mr. Karl Hudson, owner of the Hermosa Gem and Mineral Shop. It is a neat log cabin rock shop at the foot of Hermosa Cliffs, set in landscaped grounds. An attractive display of minerals as well as hand-made jewelry and polished cabochons along with rough cutting material filled the cozy Rock Shop. He has written numerous entertaining articles published in *Rocks and Minerals* and we found him as entertaining in person as he is in print. We were loathe to leave, wanting to talk rocks all afternoon. He also gave collecting information and added that we could start collecting right in his spacious yard to the side of the log cabin which he had strewn with many pebbles and rocks of cutting quality.

Silverton, Colorado

Leaving Mr. Hudson we continued north toward Silverton which is located in a highly mineralized area. From our high advantageous spot on US 550, soon after Molas Pass at an elevation of over 10,000, we saw Silverton one thousand feet below nestling in a small valley rimmed in by high mountains. Because of its great altitude, Silverton is isolated for weeks during the winter. US 550 twists and turns to the tops of various mountain passes at high elevations. We passed through heavily forested areas scarred with snow slides. With the first warm days of spring the drifts on the upper slopes plunge down the mountains crushing everything in their paths.

Gunnison, Colorado

From Montrose we went to Gunnison to visit Mr. H. W. Endner at his Curio Shop in Gunnison. He showed us the many bracelets, rings and brooches set with native gem stones. It was the largest display of mounted jewelry we had seen so far. He also mentioned collecting areas but said some of them were somewhat picked over. Oddly enough the collecting areas mentioned by Gem Exchange, Mr. Hudson and Mr. Endner were in more or less the same locality: around Dove Creek, Wolf Creek, Del Norte, Salida and Creede, Colorado.

Homeward Bound

We spent a few days fishing and then it was time to head for home. As someone once said, a vacation is a succession of 2's. It consists of 2 weeks which are 2 short. Afterwards you are 2 tired 2 work and 2 broke not 2.

Rockhounds in the Chicago area are fortunate in having a Park Board Administration that has set up six well-equipped lapidary shops. Naturally, it is my opinion that I attend the best one: Humboldt Park Lapidary Shop, under the able supervision of Mr. Ray C. Mitchell. He is not only an instructor in lapidary and jewelry crafts but is a cutter and collector as well.

Last but not least, the person who was instrumental in kindling my first spark of interest was none other than the one who was responsible for the growth of a certain cheese company — Mr. James L. Kraft. He did grind and polish for me, an employee in his company, two cabochons out of some pebbles I had picked up on a previous vacation. Their hidden beauty thus brought to life so amazed me that I have been an ardent devotee ever since.

There is so much an interested person can learn — so much that challanges your mind and imagination! This field is so vast, branching off into so many related subjects that one can spend a lifetime and still not exhaust its possibilities. I consider my first year as an amateur gem

Silverton, Colorado

cutter and rockhound only a prelude to years and years of pleasure in this particular art.

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COSMIC SEDIMENTS

By GEORGE HEILBORN

The University of Oklahoma

The question has often arisen as to the origin of the deep sea sediments and it has only been in recent years that experimental laboratories have undergone to classify the various kinds of materials found at the bottom of the oceans. The great majority of materials dredged up from the sea bottom consists of course of oozes of radiolaria, but no small part is made up of particles coming from the "outer space", that is the meteorites and the cosmic deposits.

The scientific expedition on H.M.S. Challenger was the first to throw light upon deep sea deposits but in later years, many similar expeditions have been conducted by Columbia University and other institutions of higher learning.

It has been estimated that from 15 to 20 million particles of meteoric or cosmic origin enter the earth's atmosphere. This number might seem tremendous to the reader but becomes relatively small when it is shown that it amounts to only one to each 10 to 13 square miles. It is believed that the size of the particles, which is at present small, might have been larger in early geologic time, and that the "showers" of particles were more abundant. A total of 5,000 to 7,000 tons is added annually to the surface of the earth. This quantity is sufficient to raise the bottom of the sea one foot in 50 billion years. Most of the cosmic particles are of the nickel-iron variety of meteorite.

The cosmic particles themselves are defined as iron and nickel oxides which originally were meteorites which have oxidized on the passage through the atmosphere. On the bottom of the sea, where deposition is extremely slow, cosmic sediments are abundant as compared to other places where sediments are deposited more rapidly such as on land. On the exposed surface, they soon disappear through decomposition. It is thus only in the deep sea that we find cosmic deposits. Many of the individual particles are magnetic and they often occur in the form of nodules, grains, and spherules. Three-fourth of all extra-terrestrial deposits fall into the sea, thus advocating another reason for their relative abundance on the sea bottom. A liter of black clay usually contains from 20 to 30 black spherules, and half dozen brown spherules of crystalline structure their exteriors having black magnetite while fresh surfaces contain iron alloys. The black particles are usually from 0.1 to 0.2 m.m. in size while the brown particles, which are often up to 0.5 m.m. in size may contain silicon and be of bright yellow origin.

Larger particles, in the form of meteorites, have frequently been found on the sea bottom which contain diamonds of the bort variety but too small for commercial use.

Much work has still to be done on this subject as the majority of the information derived today is hypothetical.

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Twenhofel, "Principles of Sedimentation"

"Treatise of Sedimentation"

Chamberlin and Salisbury, "Textbook of Geology"

COLORADO PLATEAU PROGRAM

(Statement of JOHN K. GUSTAFSON, Manager of Raw Materials Operations, U. S. Atomic Energy Commission, for Press Conference in Denver, Colorado, December 17, 1948)

The Atomic Energy Commission's Raw Materials program, which was approved last spring, was predicated primarily upon the need for thorough search of the United States for new sources for uranium. For years there had been practically no interest in uranium on the part of prospectors and miners. There was a possibility that important uranium deposits might be found by developing widespread interest and offering proper incentives. There was precedent for this hope; for example, the stimulus given to tungsten mining during the war had resulted in important new discoveries. Therefore, the Commission established a ten-year guaranteed price for high-grade uranium ores and concentrates and a $10,000 bonus for the production of the first twenty tons of ore or mechanical concentrates from any mining claim not previously worked for uranium. The ore must average at least 20% uranium oxide to be eligible for this bonus. These incentives are primarily for the discovery and production of pitchblende-type ores, the major source of the world uranium supply.

The Colorado Plateau was the only area in the United States actually producing uranium. Production came from low-grade carnotite ore mined primarily for vanadium, with uranium recovered as by-product. During the war the Manhattan District financed the construction and operation of two plants for the extraction of uranium from tailings of Colorado vanadium plants and also purchased uranium concentrates produced as a by-product from the vanadium operations. Following the war it was tentatively decided by the Manhattan District to purchase only by-product uranium rather than to stimulate and support increased production by special incentives. This position was based on the fact that the known uranium reserves of the Colorado Plateau were limited and expensive to mine and process and that the only advantage of an accelerater program would be to make this limited supply available sooner. Since the estimated annual production of the Colorado Plateau, even under an accelerated program, would be small in relation to total U. S. requirements and to supplies available from foreign sources, it appeared more economical to obtain the uranium as a by-product from vanadium operations which were geared to the vanadium market. The quantity of vanadium produced is much greater than the quantity of uranium recovered from these operations.

The decision to undertake a rather extensive development and production program on the Colorado Plateau was based on a number of considerations: the use and conservation of idle facilities; the conversion of underground ore reserves into immediately available finished product; and, as part of our over-all uranium program, the development of a domestic uranium mining industry adequately staffed with experienced technical and management personnel which could be rapidly expanded in time of an emergency.

There were five processing plants in the area but only two were operating and these two were selling by-product uranium to the Commission. All five plants had been operated during the war to supply the wartime vanadium requirements but three were closed near the end of the war because of the smaller demand for vanadium. Idle plants soon disintegrate and become useless. The Commission's plan is to put these three idle plants back into operation and attain maximum production justified by existing ore reserves. It takes some time from the mining of the ore until the uranium becomes fissionable material. We cannot rely too much on ore reserves in the ground to meet a war emergency.

It was realized that, to attain the production goal, prices for the low-grade Colorado Plateau ore would have to be increased to a point where the cost of uranium in the form of a high-grade

concentrate would be higher than the prices being paid elsewhere. Although production promised to be small in terms of over-all supply, it nevertheless was significant, and might be the beginning of a much larger domestic uranium industry which the Commission hopes to develop by enlisting the support of the prospectors and miners throughout the country. The AEC was, in a sense, establishing a subsidy operation to aid in the development of a new American industry.

Prior to announcement of the Commission's program last April, miners were receiving about 35c per pound for uranium and the market for ore was limited. The Commission now pays approximately $3.50 per pound for uranium in average grade ore, including haulage and other allowances. The AEC also is accepting low-grade ore for which there had been no market previously.

Current price paid by the AEC has been compared with a $5 per pound price paid in 1918 when uranium ore was bought only for its radium content. The $5 price was paid for ore containing a minimum of 2% uranium oxide and no payment was made for vanadium. Except for the occasional high grade pocket, 2% ore could be produced by mining the richer portions of the deposits and then upgrading by careful hand-sorting. This type of mining was expensive and production was small. It is no longer profitable to produce radium even as a by-product from Colorado carnotite ore. The Commission at present also pays for vanadium content, and vanadium payments constitute about half the price of the ore. Much of the ore delivered to the AEC's Monticello, Utah, station has been material which was rejected as waste during earlier operations.

About two-thirds of the employees attached to the AEC's Grand Junction, Colorado, office are directly or indirectly engaged on our exploration program. The results of this program are of utmost importance to the miners — they will determine the mining life of the area. During the past forty years, prospectors have located most of the deposits which outcrop on the rims of the mesas. Discoveries in the future will be made back from the rims where the ore-bearing formation is deeply buried. There are large areas having ore potentialities which can be explored only by drilling. The Commission has engaged the U. S. Geological Survey to map and diamond-drill these areas. The AEC's schedule calls for several hundred thousand feet of drilling a year. It has not been economic for private industry to do much drilling remote from ore outcrops. It has in general moved cautiously from known ore bodies. It is important that the Commission fully appraise the ore potentialities as soon as possible and for this reason this exploration program is being vigorously pursued.

Much of the land being explored is in the public domain and it has been necessary for the Commission to request that considerable areas be withdrawn from entry. Prospectors are given the right to stake mining claims on public domain as an incentive for the discovery of mineral deposits. Deposits discovered by expenditure of government funds should be retained by the Government and not be given to speculators who might stake claims in the path of Government drilling and merely wait to see what happens. It is expected that deposits discovered by the Commission will be made available to private industry for development and mining on some equitable royalty basis. Lands found to contain no uranium will be released from withdrawal.

Under the plan initiated only eight months ago to stimulate the uranium mining industry of the Colorado Plateau area the following has been accomplished to date:

> Buying schedules, guaranteeing for three years increased prices for vanadium-uranium ores have been established. An ore-buying station has been opened at the Commission-owned mill at Monticello, Utah, and the mill is being prepared for operation in 1949. Contracts for the purchase of uranium production from the two private plants

now operating have been extended with provision for the purchase of ore from independent miners on terms as favorable as the Commission's schedules. Negotiations are nearing completion for contracts with private companies covering the rehabilitation and operation of the plant at Durango, Colorado and the plant at Uraven, Colorado. It is expected that before the end of 1949 all five plants in the area will be in full operation. Also private industry may build a plant in western Utah to process copper-uranium ore found in Arizona and Utah. A high-grade uranium product would be sold to the Commission.

An important task yet to be completed is the development of a process, or processes, to treat economically certain uranium-bearing ores which cannot be treated by existing methods. For example, there are rather large tonnages of carnotite ores too high in lime to be processed by methods now in use. The Commission has employed research and metallurgical laboratories to develop procedures for handling this type of ore and restrictions on lime are expected to be relaxed soon. It is expected that the present price schedule will bring out sufficient ore to enable the five plants in the area to operate at capacity. Present ore reserves do not justify additional plants and the exploration program must be vigorously pursued in order to assure a reasonably long operating period for these plants. If sufficient quantities of additional ore are discovered, expansion of milling operations can be considered.

The Commission is studying whether existing ore commitments should be extended for a longer period of time in order to justify investment in mine development and equipment. In this connection, the AEC not only welcomes private participation in development and production of domestic uranium ore and subsequent concentration steps, but would like to turn over to private industry, as far as possible, the whole job of supplying the Commission with suitable uranium concentrates for the production of fissionable material. Mining and processing of ores are activities in which private industry has had long and successful experience. In mining and processing uranium ore, the Commission wants private industry to maintain its traditionally independent role, to operate in much the same manner as it does in producing copper and lead and other commercial metals.

The Commission has been requested to build roads, furnish equipment to miners, do development work, sell powder, sharpen steel, and furnish many other services normally provided by the miners themselves or by merchants and organizations established in the mining communities. As far as possible the AEC wants to avoid these forms of Government operation and subsidies in the interest of maximum freedom of private action and minimum Government control in the mining industry.

Some Day He Will Read Them All!

Editor R & M:-

Even though I don't have time to read each issue of *Rocks and Minerals* from cover to cover, I want all numbers on my shelf because some day I may have the time.

Willis P. Mould,
Williamstown, Vt.

Feb. 1, 1949

Wants To Visit Dealers!

Editor R & M:-

Along with my renewal check, I want to tell you how much I have enjoyed *Rocks and Minerals* the past year. And to thank you for taking time to identify the package of minerals I sent you last spring.

I think that I have learned a little bit about minerals, last year, but did not get to take the western trip we had planned for last summer as my husband was seriously injured in a tractor accident the latter part of May and is still an invalid. We wanted so much to visit some of the dealers who advertise in *Rocks and Minerals* and connect up the names of the fascinating things we read about with the real articles and know what we were buying. We are looking forward to that trip another summer, and through the ads in *Rocks and Minerals* will know where to go.

Minnie J. Ackland,
Clam Falls, Wisc.

Jan. 13, 1949.

THE NEWENHAM PENINSULA OF ALASKA

By FRANK H. WASKEY
Fortuna Ledge, Alaska

Listen, my dear Rockhounds, suppose you were in one of the many towns, trading posts or cannery sites that pin point the map of Alaska. And suppose you wanted to go to some other burg, mining camp, Eskimo village, City or Army Post in our beloved but changing Northland. How would you do it?

If both points were in the Railroad Belt you might go by the AuRoRa Limited or by Bus or by a Drive Ur Self, all same "outside". But more likely you would travel by Airplane, for Alaskans, Sourdoughs, Cheechacoes, Eskimo and Indians alike are perhaps the airmindedest people "what is".

F'instance, if you were in Bethel, the Mink center of the Kuskokwim Valley, and had business at one of the Salmon Cannery settlements of Bristol Bay, you would either take one of the bi-weekly scheduled DC3's to Naknek Air Base or (weather permitting) charter a small plane to take you directly to your desired landing.

'Twas not always thus. No longer ago, than the summer of 1913 I was in Bethel and wanted much to get to Nushagak, now only a short two hours across the Kilbuck Mountains and the incomparable Tikchik Lakes.

It was apparently up to me to charter a Sail or Gasboat, proceed down Kuskokwim River and Bay, around Cape Newenham (that gigantic Flat Iron that bids defiance to the storms and tide rips of Bering Sea) thread the Walrus Islands and round Cape Constantine into Nushagak Estuary. A mere few hundred miles of shifting channels and rugged coast line.

And then, what a break! The Mukluk telegraph brought word that the Ship "Explorer" of the U.S. Coast and Geodetic Survey was at Good News Bay, and in a few days would sail for Nushagak!

Memory is a bit hazy as to how I negotiated the hundred odd miles of tidal water between Bethel and Good News. Perhaps on the Mission boat "Moravian", mayhap by Kayak, but anyway not many suns after, I boarded the "Explorer" as she lay at anchor near the present but not then existent mining camp of Platinum.

The skipper listened courteously to my request for passage, informed me that there were yet several days of sounding and mapping to be done on the Kuskokwim side.

But if I wished, I could bring my 'iktas' aboard, pay the Mess Officer the per diem of forty-five cents for chow (or was it that munificent sum for each meal), be patient and sooner or later the ship's prow would point eastward from a point abeam of Newenham.

Righto and thank you, Captain. A morning or two thereafter as we were anchored in Security Cove, I received permission to accompany a work party ashore. On landing the Officer in charge told me it would be late afternoon before returning to the ship.

This gave me ample time to cross the narrow strip of tundra that separates Security Cove from Togiak Bay. A beautiful sandy shore stretched towards enticing rock buffs to the westward. There was much to look at and enjoy. It was hours before I rounded a sharp point of rock that extended almost to low water mark.

There all my senses beckoned me into a tiny crescent-shaped bay, in length not more than a quarter mile between the two cliffs that guarded it. In the back of the crescent a stratified beach of gravel, a replica (apparently) of the Nome Beaches upon which hundreds besides myself had rocked and sluiced the "yellow metallic" years before! And no Gold Pan!

It was not only the *North*westering sun and the thought of being late for the returning boat party that bade me leave, pronto, that alluring sight. The tide was coming in, and if I was to round dry shod again, the point of rocks that lay behind me, I must say goodby to that beautiful bay and its alluring strand.

With a mental promise to return, I beat it for the point, across the peninsula

and to the boat crew.

It was a year later before I again saw my bay of dreams. This time with a companion and a light prospecting outfit.

How I would love, did Old Tempus permit, to tell of our trip along the coast, this time by three hole kayak!

Arrived at our little bay, camp up and tools on the beach, what a surprise was in store! Starting a drain ditch to uncover the lower strata of the gravel at the back of the bay, the very first of the white pebbles on the blade of the half spring Number Two were seen to be not Quartz, as on the Nome Beach, but Calcite.

Oh, Well, after the first heart sinking; "Calcite is often a good gangue material, and perhaps the stringers from which these pebbles came may have carried other mineral also. If not Gold, something of value." So, Charley and I ran our drain. We not only exposed the lower gravel, but "got" bedrock also. And nary a Color.

At least not a color of the, in those days, much desired Gold. But what were those tiny rosin-like particles that lay in scanty 'smears' on top of the hard packed gray sand that lay about half tide to low water mark?

My Cheechacoe companion did not know. I "guessed" it was Monazite. I knew of Monazite's thorium content and had read of the great bodies of saprolite that were worked for Monazite in the Appalachians. And knew also, that thanks to the untiring search of the Wizard of Menlo Park for a suitable filament, that there was a market for Monazite.

But my thought was, even if this is Monazite, there is so little of it here, that it is of no commercial value.

So, that was that, except for a little more looking around in the vicinty, (with rather unseeing eyes), it was up to us to get out and back up the Kuskokwim before a Southeaster or a Norther made travel impossible.

But the memory of those yellow translucent bits on the gray sand remained vivid through the passing years. And when the part that thorium plays in nuclear fission became common knowledge the urge to again visit that tiny bay became strong.

It was not until the past summer that opportunity offered. However although my mind's eye picture of that bay and its location was definite, thirty-five years is a long time.

It took two flights from Dillingham, more than two hours by float equipped "Cub" first with Elmer Smith, and later with his brother, Sherb, before we sat down at the marge of the right little Bay. There are several of these rock bound bights between the Slug River Flats and Cape Newenham.

There was the Calcite at the back of the bay. But where were the hard packed gray sand from half tide down, and where were the irregular smears of the rosin-like mineral,

Instead of the hard gray sand that had acted as bedrock to hold the yellow specks, there was a silty sand full of water, and of (with our scanty tools) indeterminate depth.

Perhaps in the last few decades there had been a subsidence of the coast line. And, or, the strong undertow of the severe surf which often runs along this coast had by reason of some change in the tidal currents ceased its function of sweeping the beach clean of the muddy material left by the melting ice piled deep along the strand by the winters storms.

Before taking off for home an hour's examination of the rock *in situ* in the near by cliffs inspired the wish to visit the locality again. Next time to camp a week or more and with an outfit that included a Geiger counter.

And all we saw in those cliffs of particular interest was a rock that was weathered to the green and appearance of Nephrite, but was not Nephrite, some cross fibre asbestos and a so far unidentified mineral that had the color and sheen of Molybdenite but was Mica-like.

And so; not 'to bed', vide Pepys:

Rather, To Dream, to Dare, to Do;

"For Age is Opportunity, no less than Youth itself.

GEODES AT GARDEN PARK, COLO.

By GLENN R. SCOTT

Introduction

The geodes at Garden Park were discovered by Mr. F. C. Kessler, about 1940, while on a field trip and search for dinosaur remains with students of Canon City High School. Mr. Kessler guided the writer and Mrs. Scott to the location in September 1944. The location has been revisited by the writer several times since 1940 with Mr. Kessler and with Mr. Jesse L. Myers of Pueblo, Colorado.

Topographic Setting

Garden Park is a local badland area about eight miles north of Canon City, Fremont County, Colorado. It is accessible from Canon City by the Red Canon road to Cripple Creek. Oil Creek and its tributaries, Felch Creek and Millsap Creek drain most of the park. Cedar and Pine trees and Sagebrush grow in this park.

Geology

Garden Park is part of the "Canon City Embayment", a structural basin that originated during the rise of the Rocky Mountains. The escapements in the park are formed by the Cretaceous Dakota sandstone. Where the Dakota sandstone is eroded away, the Jurassic Morrison formation forms a badland. The soft shale of the Morrison formation is red, green, and grey in pastel shades. One deeply colored area in the park is called "Little Painted Desert" locally. Red jasper and red agate are abundant at some places in the Morrison Formation. The geodes occur in a 2 to 6 inch siliceous layer in the variegated shale. The layer is very hard where fresh, but in weathered exposures the geodes separate and roll down the slope. The Triassic Lykins shale is a red bed. Extensive deposits of gypsum and its varieties, selenite, satin spar, sugar spar, and alabaster occur just above the contact of the Lykins and the Morrison.

Mineralogy

The geodes should be classified as quartz geodes with inclusions. The quartz crystals are clear, citrine or light amethyst. None are larger than three-eighths inch.

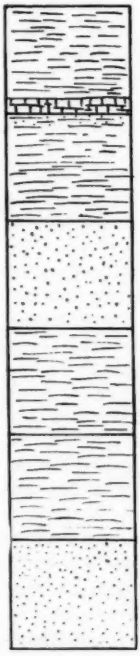
Most of the geodes contain scalenohedral crystals of yellow calcite. Some of the crystals are one-half inch across the base of the pyramid.

Large cleavable masses and single crystals of barite and celestite are present in some of the geodes. The barite crystals are clear and amber and the celestite crystals are blue, milky, and clear with pink flecks.

In some of the geodes the quartz, calcite, barite, and celestite are penetrated by acicular, dark-brown metallic crystals. The acicular crystals were examined by Dr. C. S. Hurlbut, Jr. of Harvard Uni-

STRATIGRAPHY

of Garden Park, Colo.



Niobrara fm.
shale & limestone

Benton fm.
shale

Dakota fm.
sandstone

Morrison fm.
shale

Lykins fm.
red shale

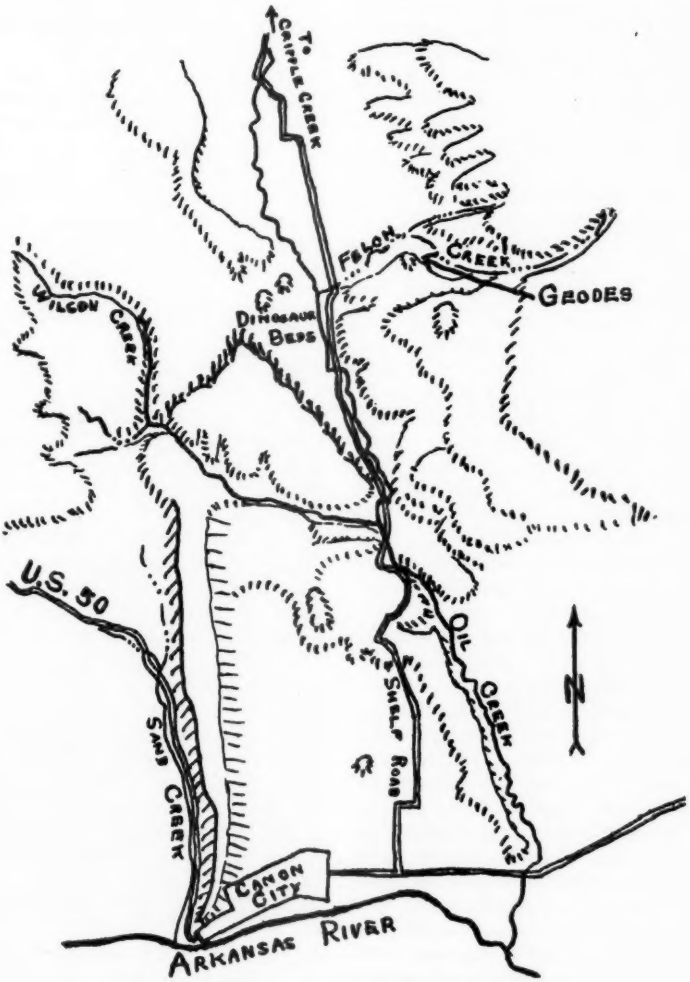
Fountain fm.
red sandstone

versity recently on behalf of Dr. C. N. Eddy of Boulder, Colorado. Dr. Hurlbut wrote in part, "I have examined the geode that you sent to me. The one with the small dark crystals is surprisingly like the one we recently described from Keokuk, Iowa (Rocks and Minerals, June, 1948) and the dark crystals are goethite."

Conclusion

The combination of minerals described above make very attractive and interesting geodes. The number of specimens at the locality is almost unlimited, however, the overburden is thick and some digging is required.

The attractiveness of the locality is increased by the presence of alabaster nodules, jasper, red agate, dinosaur remains, and Indian artifacts.



Map of geode location at Garden Park, Colo.

TURQUOISE—A PIECE OF SKY TURNED TO STONE

By G. KEITH HODSON

Nevada Turquoise Mines, Inc., Box 168, Mina, Nevada

Turquoise is a gem mineral prized for its perfection of color. When of the finest quality it has a dark blue color and sometimes has a spider-web effect. The spider-web turquoise is now considered the finest, but color being the same, it is a matter of personal taste. Most often turquoise has a greenish cast and in many stones the green is predominant. This green color lessens the value of the stone.

Turquoise comes from but few places in the world and the better grades are yet harder to find. Turquoise seems to be confined to regions of barrenness and aridity. It is found in Persia, Central Asia and in the Southwestern portion of the United States. Nevada Turquoise is considered to be some of the best found in the world.

Turquoise was known and used as an ornament in remote times. Along with its pleasing color this is probably due to its relative softness. Its hardness is from 5 to 6. It has been found in the tombs of the earliest Egyptian kings, some dating back to before the first Dynasty. Along with its intrinsic worth it is considered by many peoples to have mystic properties and religious significance. The Navajo Indian considers it his most prized possesion and many people believe that when given the person who receives it will have good luck.

The origin of the name seems to be in doubt. In Latin it is called Turchus or Turchicus, either because of its excellent beauty, or because it was brought to the Europeans, during the Middle Ages, from Persia by way of Turkey. Thus the name Turquoise. Chemically turquoise is $H_5[Al(OH_2)]_6\text{-}Cu(OH)(PO_4)_4$, that is, it is a basic phosphate of copper and aluminum. The blue color is thought to be due to the copper content. It has been advanced that ferric iron, if present, imparts a greenish shade. From my mining I find that much of this does not seem to ring true. It has been noted by this writer that the higher the iron content of the ground, usually limonite, tthe darker blue the turquoise. This limonite covers the turquoise so completely at times that the turquoise, "Is Blind". That is it can not be readily distinguished from the country rock. The matrix or spider-web effect, if any, is usually this same limonite. It would seem that much is to be yet learned about turquoise.

It is triclinic, but has been found in but one place as tabular crystals. It is usually amorphous, occurring in veins or crusts (seam type), and as rounded masses (nodular type). It is a secondary mineral and is often associated with limonite, feldspar, quartz and kaolin. It occurs in trachyte, quartzite, shale and cherty rhyolite. The better grade is most always found in the limonite-stained rock.

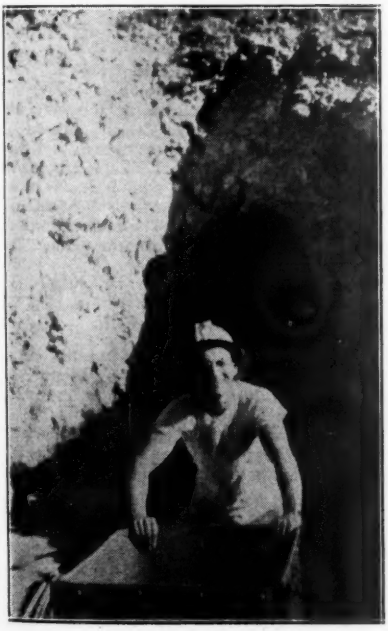
Origin of Turquoise

The origin of turquoise is somewhat of a question, but it is safe to say that it is not a primary vein mineral. It has been formed by the percolation of surface waters of ordinary temperature descending through mineralized rocks. The alumina is probably derived from feldspars or aluminum-bearing rocks. The copper is derived from disseminated copper ores. Deposits of copper or copper stains can always be found close to deposits of turquoise, and at times malachite, azurite and chrysocolla have been found occurring right along with the turquoise. The phosphoric acid found in turquoise is most likely formed from apatite, since apatite is found so abundantly.

Mining Turquoise

Turquoise being of surface or near surface origin is not found in quantity at any great depth. Very few important deposits are known to exceed 100 feet. It usually can be seen on the surface and good material can be found within a short distance thereof. The mining is rather difficult due to its tendency to pinch out and disappear. It is very unusual for any great amounts to be found at one time. Usually one has to be content with a small

seam or two. These are followed down with the hope that they will increase in size or that more will be found. Turquoise is also found as nodules, pebble like, and these are found in pockets in the comparatively soft country rock. Up until recently most of the mining was done by hand. Mostly this was due to the fact that turquoise is confined to desert regions and supplies of water and timber were hard to find. Also the fact that the turquoise deposits are small and rather shallow tends to make modern mining impractical. I use compressed air and modern machinery wherever possible, but the lack of roads or a possible road still limits a modern application of mining it. I use a small compressor and with my jeep have been able to get into places that look almost impossible to reach. The workings will depend upon the grade and amount of turquoise to be had. Open cut trenches, shallow holes, drifts and shafts are employed. Great care is taken not to fracture the turquoise any more than is necessary. Blasting is done, but when in the turquoise or turquoise is expected to be found, light charges and short holes are used. If the ground is of a soft nature the turquoise seam or nodules will be picked out by hand. This is not always possible or practical though and one soon learns how to use a small amount of powder to good advantage. All in all the mining is a lot of hard work, but when in good turquoise a fever of joy is felt that is beyond the expression of words.



The writer at the portal of Blue Gem Wonder claim located in the Pilot Mts., east of Mina, Nevada.

Cutting and Polishing Turquoise

The stone is cut cabochon in most of the usual forms of that cut. The method of cutting it is much the same as that of agate or wood, but since it is comparatively soft care must be taken not to cut the stone away to nothing. A smooth wheel of fine grit is most desired by the writer. Especially is this true when cutting the spider-web type of turquoise. This spider-web effect is due to many small nodules cemented together by the matrix. This type of turquoise is very hard to cut unless great care is taken. The final polish differs from that of the harder stones. Wood, felt that is very soft, and leather are all used. I prefer the soft felt, but many like the leather buff. Tin oxide seems to be the best polishing agent.

Turquoise Imitations

Turquoise has been imitated from the earliest times, but recently it has taken on an even more ugly aspect. At present much of the turquoise on the market has been dyed, oiled or even pulverized, dyed and then compressed. None of these treatments would be so distasteful if this treatment was so stated, but usually it is not. To the writer's mind this is like buying a synthetic gem for the real thing.

Many imitations can be seen at a glance, but others are very clever and must be tested before one is certain of its true character. Most imitations are of the oiled type. This is turquoise of inferior color and when wet with water (this type is very porous) will take on a much better blue color. This of course is very temporary and therefore, oil of many sorts. even

grease, is used instead. This oil treatment is not lasting and the improved color will last but a short time. There are several methods of oiling and some are better than others, but all will in time fade and the stone will turn an ugly green or may even turn back to white or near white. This oiled turquoise can be detected by the oily look or feel at times. Especially if the stone has been in the sun or in a warm room. Ammonia will remove this oil somewhat, as will sanding, and the hoax can be seen. The only sure way not to be taken in is to buy from a reputable dealer or jeweler. The price of the stone or piece of jewelry will also give some indication as to what you are getting.

Turquoise Prices

In the rough turquoise demands many various prices. These may range from as low as $1 per lb. to $150 per lb. Most of this price range is due to the quality of the turquoise, but also the law of supply and demand comes into play. The better grades have always demanded a high price. Not only because of the fine color, but because it is very scarce. The better grades are getting harder and harder to find and unless new deposits are found they will become a thing of the past.

The best quality cut turquoise is around $1 per carat today, that is, in the United States. The value of turquoise varies greatly with peoples and time. For example in 1914 in the United States turquoise was not popular buy, yet $10 per carat was an average price for good quality turquoise. Stones of more than 10 carats were worth a great deal more. A single stone of 320 carats worth $2,600 was found at Searchlight, Neveda, in 1904. In Persia, the birthplace of turquoise, the price has always been good. But regardless of times, peoples and fads, turquoise will always be in demand. It has been said that in this country so long as there is an Indian alive there will be a demand for turquoise. Turquoise, the stone of the ancients and the moderns, is indeed a piece of sky turned to stone.

Tourmaline Being Mined In Pala, Calif.

A correspondent informs *Rocks and Minerals* that some very fine gem-quality green tourmaline crystals have recently been mined in the Pala, Calif., tourmaline fields. The crystals come from a new pocket. This is believed to be the first honest - to - goodness mined tourmaline from the famous locality since 1900.

J. W. Bradley On Sick List

We are sorry to inform our readers that J. W. Bradley, of "The Bradleys", 4300 Budlong Ave., Los Angeles 37, Calif., is on the sick list. He has been in a hospital but is now at home where he is improving nicely but will have to take it extremely easy for a long time. Their ad appears on page 199 of this issue).

New German Magazine

A new mineralogical magazine, called *Achat,* made its appearance during 1948. This is a monthly magazine, printed entirely in German, and is published by Achat, Hamburg-Heinrichstrasse 14, Hamburg, Germany.

(American Agency is the Earth Science Digest, Revere, Mass.)

Minerals Unlimited issues general catalog

This is the first catalog of one of California's popular mineral dealers, known as Minerals Unlimited. The firm consists of David B. Grigsby and Scott J. Williams, geologists and mineralogists. The catalog is in loose-leaf form (so supplements may later be added) and consists of 40 pages. The minerals, which come from noted localities throughout the world, are listed alphabetically.

Copies of the catalog may be obtained on request by contacting Minerals Unlimited, 1724 University Ave., Berkeley 3, Calif.

Gem Exchange issues 1949 price list

The Gem Exchange has just issued its 1949 price list which consists of 18 pages listing minerals (chiefly gem material), books, magazines, lapidary supplies, etc. A commendable feature of the price list is that the minerals are listed by states and countries from which they come.

The price list is free and can be obtained from the Gem Exchange (Gem Village), Bayfield, Colo.

Scientific equipment magazine free on request

Eberbach & Son Company, Ann Arbor, Mich., will send, free, copies of their scientific equipment magazine, Eberbach Announcer. This 16-page magazine is devoted to scientific equipment handled by the company.

RECENT VOLCANIC ERUPTIONS

During the past few months there have been a number of volcanic eruptions throughout the world. In the Philippines, Mt. Hibobhibok, on Camiguin Island, began erupting on Sept. 1st, 1948, which continued for a number of days. Heavy smoke and ashes were thrown out to a height of 18,000 feet while molten lava gushed out to flow down the mountainside. So violent was the eruption with its deadly volcanic gases, that most of the island's population, which numbered 55,000, had to be evacuated to escape death.

Hibokhibok Volcano, 5,620 feet high, is in the central part of the island which is about 14 miles long and 12 miles wide. Camiguin Island is in the Mindanao Sea, 10 miles northwest of Talisayan, a little seaport on the north coast of Mindanao, the second largest island of the Philippines. There is another Camiguin Island (also small) about 35 miles north of Luzon, the largest island of the Philippines.

During the latter part of October, Villarica, a Chilean volcano, erupted and is reported to have caused a heavy loss of life and property. Villarica, 15,996 feet high, is in northeastern Valdivia Province of Central Chile, about 90 miles northwest of Valdivia, a seaport on the Pacific Ocean. Villarica Lake, a beautiful body of water, 21 miles long, lies a little to the northwest of the volcano.

In Hawaii, the giant volcano, Mauna Loa, began erupting on Thurs., Jan. 6, 1949, which at first caused great alarm as a stream of lava, estimated to be 12 to 15 miles long, flowed down its western slope. Some seacoast villages 20 miles west of the volcano were virtually abandoned, due to the fear that the fiery molten lava would reach and cover them.

Mauna Loa, a volcano 17,760 feet high with a crater nearly 5 miles in circumference whose inner walls are from 500 to 600 feet high (vertical precipices), is situated in the central-south portion of Hawaii, the largest of the Hawaiian Islands. About 20 miles southeast of Mauna Loa, is Kilauea, the world's largest active volcano (See *Rocks and Minerals*, Aug. 1945, p. 365.).

During the fall of 1935, Mauna Loa was in eruption but this time the people ran towards it instead of away from it. The flow at that time was very slow and the lava so cool that spectators picked up wads of it to knead in their fingers. This eruption was written up by Miss Kaniu Hopai, of Hilo, Hawaii, and appeared in *Rocks and Minerals*, Dec. 1936, pp. 264-265.

On Feb. 5, 1949, the Tokyo Weather Bureau reported that Yake-yama (Mount Yake), a 7,900 foot volcano, which had been dormant for 97 years, erupted violently and scattered ashes over a 100-mile area. Yake-yama is 150 miles west of Tokyo, in the western part of Honshu, the largest island of Japan. The volcano is in the northeastern part of Hida Province, near the Shinshu Province border. Not far from Yake-yama are the Hiragane silver mines which lie at an altitude of 7,000 feet.

Lots Of Stones!

Editor R & M:-

I enclose $3.00 as renewal payment for 1949. Happy New Year and a lot of Stones.

Charles Worbs,
East Liberty, Ohio

Jan. 1, 1949

May Ration His Reading!

Editor R & M:-

I have meant to write for some time to tell you how much I enjoy *Rocks and Minerals* but never got to it before. I read it from cover to cover and the only suggestion I can offer is that it isn't big enough, that is from cover to cover. It doesn't take long enough even though I usually read them two or three times.

I can understand why you must become bimonthly but I pray that it won't be for long. I'm getting old enough that time passes fast but I dread to think of waiting TWO months for the next issue. Guess I'll have to ration my reading to make it stretch.

Please accept my appreciaton of the good work you are doing.

John E. Sparks,
Madison, Ind.

Sept. 1, 1948.

HISTORIC RINGWOOD MINES SOLD

$700,000 PAID FOR JERSEY IRON PROPERTY THAT COST GOVERNMENT $4,000,000.

Washington, Dec. 15 (A. P.).—The War Assets Administration has sold a pre-Revolutionary war iron mine property at Ringwood, N. J., to the Petroleum Export-Import Corporation, New York City, for $700,000. The property cost the Government about $4,000,000.

The Government bought the property in 1942 to increase iron ore production. The WAA said improvements at the plant were completed in time for it to go into operation for national defense.

A. E. Lynch, Midland, Tex., is president of the Petroleum corporation, which told the WAA it plans to spend about $425,000 for plant improvements and mine developement on the Ringwood property.

SECOND SALE OF MINES.

Today's sale of the historic Ringwood, N. J., mines to the Petroleum Export-Import Corporation for $700,000 was the second transfer of the property by the WAA since the Government bought the mines in 1942. The mines were sold to Patrick Moran, president of Ringwood Mines, Inc., for $1,275,000 early in 1947, but the WAA said the property was taken back by the Government because Moran did not meet the terms of the sale.

The mines had been closed since 1931, when the Government bought them early in the war and undertook to rehabilitate them as an emergency source of iron ore in the event of disruption of Great Lakes ore traffic by enemy action. The Defense Plant Corporation spent $4,000,000 on a rehabilitation project.

The Senate War Investigation Committee reported in 1945 that the Government had withdrawn its support from the project before a pound of ore had been removed. The War Production Board stopped the work in 1944 because it felt the mines were no longer necessary to the war effort, the committee reported. The mines were declared surplus property and offered for sale in September, 1945.

PRODUCTION IN FEBRUARY

The Petroleum Export-Import Corporation expects to start production at the Ringwood mine by February, Alex Labounsky, executive vice-president, said at the company's offices, 350 Fifth avenue. Peak production is expected by the end of 1949, he said.

Labounsky said engineers' reports indicated that the property contained over 8,000,000 tons of desirable ore. The ore at Ringwood averages more than 60 per cent iron, compared with 51½ per cent for Lake Superior ore, he said.

Approximately one-third of the ore at Ringwood is so-called lump ore, which does not require treatment before it is sent to open-hearth furnaces and is therefore of the most desirable type, according to Labounsky.

The company expects ultimately to mine 400,000 tons of ore a year at Ringwood. Labounsky said. He explained that there is a heavy demand for such ore within an area which can be reached from Ringwood with favorable freight rates.

DATE BACK 200 YEARS.

The Ringwood mines date back more than 200 years and produced iron which was used to forge cannon and munitions for George Washington and his Revolutionary armies. Iron from the mines was used for casting a chain which was strung across the Hudson below West Point to block British ships. The cannon on the main deck of the frigate Constitution (Old Ironsides) was made from Ringwood iron.

The New Jersey Government confiscated the mines in 1780 and later sold them to the Ryerson family. They were acquired in 1853 by Peter Cooper, founder of Cooper Union, and later were the property of his son-in-law, Abram S. Hewitt, once Mayor of New York. They were purchased by the Government from the estate of his son, Erskine Hewitt, who died in 1938.

—*The New York Sun,* Wed. Dec. 15, 1949.

The Ringwood iron mines are in northern New Jersey (at Ringwood in northern Passaic County). They are all magnetite mines and among them are the Blue, Cannon, Cooper, Hard, Hope, Keeler, Miller, Peters, and St. George. The Peters is by far the largest of them all.

The Ringwood mines have long been known for minerals and many collectors have visited them. Among the minerals found there and which the Peters mine furnished the most are amphibole (hornblende and mountain cork), calcite, chalcopyrite, chlorite, corundum, crocidolite, epidote, garnet, graphite, heulandite, ilmenite, laumontite, limonite, magnetite (the ore of the mine) and also martite, melanterite, molybdenite, orthoclase, phlogopite, pyrite, pyroxene, quartz, rutile, serpentine, (crysotile, marmolite, etc.), stilbite, talc, and zircon.

We hope the new owners may permit collecting to continue at these historic old mines whose many minerals have added their bit to make New Jersey one of the world's greatest mineral areas.

HUGE ZIRCON FROM AUSTRALIA

By GEO. W. CHAMBERS

P. O. Box, 1123, Encinetas, California

In a parcel of 100 zircons imported by the writer from Australia, was an enormous crystal which is believed to be the largest and most perfect zircon crystal known. The crystal is 3 lbs. 8¾ ozs. in weight. Three of its faces measure 2¼ inches while another is 3¼ inches. Unfortunately this fine crystal is not of gem quality.

The writer has been handling rough gem zircons for many years but never saw nor even heard of a crystal as large and as fine as the one just described. This huge crystal was obtained from a prospector who wrote that the 100 crystals exhausted a pocket and that he cannot find any more. Some of the crystals are fluorescent.

The exact locality for the huge zircon is a secret as the prospector would not reveal it. However zircons are fairly common in the gold regions of Australia where they occur as waterworn pebbles with topaz and other minerals in the auriferous (gold-bearing) gravels. Remarkably fine red zircons occur with diamonds and sapphires in the diamond-bearing gravels at Mudgee, N.S.W. Fine blue pebbles are found in the auriferous gravels of Queensland but perhaps the most famous locality is the Anakie sapphire field where in the auriferous gravels large zircons (red, brown in color) are a common associate of amethyst, chalcedony, diamond, garnet, gold, hornblende, ilmenite, jasper, magnetite, rutile, sapphire, smoky quartz, spinel, topaz, and tourmaline. Zircons, of beautiful color and luster, many weighing over 30 carats, have been cut from stones found in this famous field of Queensland, Australia.

The huge zircon crystal, looking down on the termination.

Always Deals With Advertisers!

Editor R & M:-

I enjoy *Rocks and Minerals* and have dealt with many of your advertisers to good advantage. As a matter of fact, I have never bought any stock from anyone but a regular dealer.

A. F. Lockhart,
St. Paul, Minn.

Jan. 6, 1949

THE 230 SPACE GROUPS

By CHARLES A. BELZ
Secretary, Philadelphia Mineralogical Society

If you were to ask someone "What is a spiral stair?" you would in all probability get the answer, "One that goes like this," accompanied by the characteristic gesture which is intended to show how a spiral stair does go. His gesture conveys the idea so much more accurately than any verbal description might. Mere words are so inadequate to give substance to a space idea, and for that matter, even a perspective sketch is no more than a crutch for the imagination, a trick of drafting to make a line drawing on the plane surface of paper deceive the eye into seeing depth where there is none.

There is in the catalog of phrenology, a bump on the cranium which denotes a pronounced faculty for "mental focus". This bump is standard equipment for crystallographers whose mental vision must not only penetrate the innermost reaches of inter-molecular space, but be able to make some sense of the indescribable confusion of molecules, atoms, or ions packed together in the infinite number of combinations, and in the complexity of design necessary to account for the staggering inventory of articles produced in the factories of Nature.

The need is for a superior kind of stereoscopic mental vision which can steadfastly resist a gravitational habit toward point or plane focus, and can rigidly maintain a focus in depth. To think of crystal structure in terms of lines and diagrams is to see the *picture* of an edifice; to channel most rigorously one's contemplation to space elements, is to be in fact, a venturesome traveller standing in person before this awesome architecture.

For the adult mind, such unaccustomed projection is not easy, as we found out when Dr. J. D. H. Donnay, an eminent research scientist in Crystallography, and Professor of Crystallography and Mineralogy at the Johns Hopkins University, addressed the Philadelphia Mineralogical Society on "The 230 Space Groups".

He emphasized the distinction between plane or flat world conceptions, and space concepts. The world we lived in as children was essentially a three-dimensional world, a world of solids. We played on the floor with our building blocks, arranging them in long walls, building huge forts, or sky-high towers with equal abandon. Ideas never plagued us, and our lives were filled only by the things we could see and touch. But in time we became grown-ups and were afflicted with many new problems and situations which we could only tell about by illustrating our words with pictures, or maps, or diagrams of a sort. We wanted people to see as well as hear what we were talking about. As a result, we ourselves grew more and more accustomed to projecting our thoughts to a plane screen, and focusing our mental vision on a flat world. To inspect the structure of space, however, we must first make a clean break from these habits and let our imagination gallop off, like the headless horseman, in all directions at once.

The historical events, which ultimately led to the discovery of the 230 space groups, began with the observation that certain minerals occurred naturally in forms that possessed flat, smooth faces, and that the angles between these faces showed a remarkable constancy for crystals of the same material no matter where found. With the development of the microscope, it was unexpectedly discovered that many minerals were crystalline because the crystal form was only evident under higher magnifications. The list of minerals exhibiting this feature of regularity and uniformity of shape grew, and eventually led to the conclusion that a phenomenon such as this would be impossible if the arrangement of molecules in the crystal were purely accidental or haphazard.

With the notion that the faces of a crystal were placed in obedience with some natural law finally accepted as a fact, it was natural that some endeavor must be made to find some rational sys-

tem of classification. This could not be accomplished on the basis of apparent likenesses since accidents of growth were known to cause great differences in the shape of crystals of the same mineral, whereas comparison of face position, and the angles between adjacent faces unmistakably indicated that there actually was some common basis on which crystallization proceeded. If two crystals which do not look like each other are yet, in some way the same, wherein lies the identity? The answer lies in the *relationship* which certain elements of that crystal bear to each other, and a relationship which must invariably be characteristic of that particular crystalline substance.

As solids of geometrical shape, it is only natural to begin with three base lines or axes, at right angles to each other representing the three space directions. Classification could be made on the basis of axes of equal length, on axes of different lengths, and to include other forms, to assume axes at inclinations with each other, thereby grouping all crystals roughly into a few great systems according to their principal axes. Further classification could be made on the basis of the relationship of the different crystal faces to these axes. Pursuing this thought still further, it was observed that there existed certain degrees of symmetry according to which these faces were grouped around their axes. Axial symmetry of a solid bounded by plane faces is more limited than might at first be supposed. For example, if we were to select any object on which our glance might rest, say, a ladies' hat, and turn it about ever so many ways, we would discover that we would have to turn it about a whole revolution before it presented exactly the same appearance again. In other words, the axis of rotation would be of order one, which is a mathematical expression for no symmetry at all, but which must be accepted as a classification because there are crystals of this kind. Fortunately most crystals are not afflicted with such extreme individualism.

If we were to select a playing card, the king of clubs for instance, we would find that if the card were rotated about a pin through the center, we would need to turn the card only half a revolution, or through an angle of 180 degrees, to get the same picture. This would represent an axis of order 2 or axis of two-fold symmetry because the same appearance is presented twice in one revolution. An equilateral triangle looks exactly the same three times in one complete revolution, and a pin through the center would represent an axis of three-fold symmetry. The ancient symbol of the swastika will show an identical appearance four times in one complete revolution, and its axis of rotation, therefore, is an axis of four-fold symmetry. A sink strainer with holes at 2, 4, 6, 8, 10, and 12 o'clock will look exactly the same at each sixth of a turn, and in one complete revolution will show six similar positions, and therefore its axis of revolution is one of six-fold symmetry. It can be proved mathematically that there cannot be in a crystalline solid, an axis of five-fold symmetry, nor an axis of symmetry greater than six.

We have, therefore, in the "axis of symmetry" one element by which a system of classification could be devised based on the relationship of the various faces to that element. It is likewise possible to find within some crystals a point ("center of symmetry") about which faces can be symmetrical in pairs, and as a third possibility, "planes of symmetry" can be recognized with respect to which faces can be symmetrically arranged.

In starting a filing system, we estimate the amount of material which we anticipate, and buy enough drawers, and a complete set of index tabs, not waiting until a letter arrives before we buy the tab needed for that letter. Likewise, in establishing a system of classification, it was necessary to determine how many different possible combinations of the elements of symmetry there could be. The possibility was not overlooked that symmetry could be obtained by rotating the crystal about an axis and, at the same time, inverting it through a point on the axis. By taking these elements of sym-

metry in all possible combinations only 32 crystal classes were found, including the one class for asymmetry (or no symmetry at all).

It is interesting to note that Hessel, a German, predicted these 32 crystal classes in 1830 when representatives of only about half of them were known.

All of these considerations depend on crystal form, but as crystal form depends on crystal structure, the explanation of the reason for these forms must be sought within the crystal itself. Progress in understanding has reached the point where the mind accepts, with no protest, the concept that all matter is composed of sub-microscopic particles the nature and arrangement of which determine the physical characteristics of the substance as we know it. Imagination has far outraced sensory perception in this regard, and deductions from the observable has reached the inevitable conclusion that the obvious regularity and orderliness in crystal form must be ascribed to a regularity and an orderliness in internal structure. A crystal of cubic form, which on further inspection is discovered to be isotropic as regards its rate of solution, its optical properties, its electrical conductivity, its magnetic behaviour, its thermal characteristics, must also have the internal arrangement of its molecules (or atoms, or ions, as the case may be) built on the cubic order. If the eye was powerful enough to see these pin points of matter within the crystal, it could not fail to notice their equal spacing, side by side, front to back, and top to bottom. If one could imagine lines drawn between four of these points, the cubic shape would be unmistakable. If this powerful eye could see within a cube of galena, and planes imagined through all the atoms of lead, a cubic cell would show if planes would be drawn through all the atoms of sulphur, the same cubic cell would be seen.

On the sole evidence of 90 degree interfacial angles, a tetragonal crystal might be mistaken for a cube, but other physical tests would show the true symmetry: for instance, optical properties will vary with direction. Therefore the internal arrangement of the atoms or molecules, in some way, must show a variation in different directions. The "X-ray eye" could detect that the spacing of particles on the internal framework would conform with the variation in the physical characteristics, and the lattice shape would unmistakably be tetragonal. There are many kinds of arrangements for these internal constituents of matter.

If crystal structure were entirely haphazard as might happen when a bucket of sand is poured upon a table wherein the grains of sand assume positions entirely by accident, the homogeneity of the crystal would be statistical only. But since the arrangements are limited by habits of regularity and orderliness, the homogeneity is called periodic and the number of combinations is limited.

In our searching inspection of the internal structure of a crystal of galena, our discovery that the atoms of lead or the atoms of sulphur marked the four corners of a cube was accompanied by the discovery that there were thousands upon thousands of such unit-cubes, endless rows side by side, and endless tiers stacked one upon the other. The pattern or motif is the content of a unit cube. The cube has become migratory, and by movement or translation has materialized after millions of such repetitions into the cubic crystal, life-size.

There are seven fundamental unit cells, which by translations generate crystals. Life would be simple indeed if all matter were of a chemical composition as elementary as the galena crystal with its atoms of lead and sulphur. But many substances, for instance silicates, are of an extremely complex composition. The various atoms, or atom groups we know to be arranged in an orderly, regular, repetitious pattern because they occur in crystalline form.

By adding to the seven primary unit cells the ones that might be obtained by "centerings", Bravais in 1850 established 14 space lattices. Examples of such centerings would be given by a translation of the unit cube one half the distance along either diagonal resulting

in a face-centered or in a body-centered cubic lattice, since one corner would be either at the center of a face or at the center of the original cube .

In the light of present day knowledge, the 14 lattices are indeed an oversimplification of the complexities of internal structure, but is was not until 1879 that the German mathematician Sohncke introduced a new element of symmetry, the "screw-axis", combining rotation and translation. These terms might seem formidable, but the action is a very common occurrence. A wood screw entering a block of wood combines rotation and translation. To elaborate, imagine a square nut on a threaded rod, which may represent the axis of rotation. Place a dot on each of two adjacent corners, and rotate the nut one complete turn. The dots will now be in the same relative position to the rod, but will have advanced a distance equal to the pitch of the thread, and might be conceived to represent the two points of the next unit cell. The nut may be rotated 1/2, 1/3, 2/3, 1/4, 3/4, 1/6, or 5/6 turn and the dots will advance corresponding fractions of the pitch of the thread. By introducing this method as a possibility of locomotion of atoms through space new patterns of arrangement can be envisioned. By the addition of this screw-axis to the Bravais lattices, Sohncke arrived at 65 possible arrangements, which he called "point systems".

Sohncke's conclusions were given wide publicity, but actually this was only half the problem. Twelve years later one of those phenomena occurred which are difficult to explain as mere coincidence. Schoenflies in Germany, Federov in Russia, and Barlow in England, working independently introduced a new element of symmetry, the "glide-plane", combining reflection and translation. As a consequence, the number of possible space groups increased almost fourfold. Schoenflies and Federov simultaneously, and Barlow only slightly thereafter, announced a total number of 230 possible groups, and this total has never been challenged. The 230 space groups are distributed among the 32 possible crystal classes (or point groups).

Like the screw-axis, the glide-plane combines translation with another operation (here reflection). As an embryonic thought on the matter, imagine footsteps in the snow made by a person walking along a straight line. The right footprints are mirror images of the left footprints except for the fact that one step in each case is advanced from the true mirrored position. This might be described as a mirrored reflection plus a glide forward half the distance from left print to left print. Now, instead of a line in the snow, imagine a huge plate glass mirror against the wall, and in front of that mirror hundreds of little heads regularly spaced in rows, and the rows evenly spaced from top to bottom. Each little head faces the mirror and sees its reflection directly opposite. Now imagine all the little heads at a given signal to shift half a space to the right, but at the same instant something has happend to the law of optics, and all the little reflections have remained where they were. Whether we think of the faces as shifting, or the reflections as shifting, we may describe the operation as a "reflection-plus-glide" and the mirror itself as the "glide-plane".

This might on first thought be considered a difficult way to distribute simple points in space, regularly spaced, but to the little faces, let us substitute a molecule which has one kind of atom for a skull, and other different atoms for the eyes, and the nose and mouth. This might be somewhat of a caricature of an asymmetric molecule, but such molecules, and even more complex ones are known to exist. The problem of fitting a pattern or a lattice around a system of points in which there is a special orientation, like the heads before the mirrors, is now capable of solution by the expedient of combining with the basic lattices and screw axes the principle of glide-planes. Since the number of combinations of molecules and atoms that make up matter could not even be guessed at, the crystallographer reversed the situation and endeavored to determine mathematically how many dif-

ferent lattice-like structures, assembled from the known structural elements of the simple basic lattices could be fashioned, all conforming with the known peculiarities of crystal occurrence. By every possible arrangement arrived at through translation, screw rotation, glide-reflection, in every possible combination, it was finally established that there could be only 230 possible space groups. One of these groups will be found to fit any possible combination and orientation of points in space, regularly arranged in such manner to conform with the necessity for crystal structure.

In a space groups, the "fundamental domain" contains those points, the repetition of which generates the motif. The "complex domain" or unit cell embraces the complete motif, which by translations multiplies itself into the whole crystal structure.

While it is true that most of the theorizing as to the internal structure of crystals has been a mathematical analysis to rationalize known phenomena of nature, actual proof had to wait until the discovery of crystal structure analysis by x-ray diffraction. The diffraction of x-rays by crystals has proved the periodicity of crystalline architecture.

NEW JERSEY STATE GEOLOGIST SPEAKS AT EXCHANGE CLUB

Mineral resources and industries of New Jersey were enumerated by State Geologist Meredith Johnson to members of the Paterson Exchange Club yesterday. He was introduced by Vice-President Charles De Walsche.

In conjunction with his interesting talk, Mr. Johnson showed colored slides of the various mine subjects. The mineral industries have much to do with the operation of manufacturing industries the speaker pointed out.

One of the most important minerals in the state with regard to a sense of value is that of zinc, mined in Franklin and Ogdensburg in Sussex County the tonnage produced ranges between 550,000 and 665,000 annually. The almost pure zinc is used in zinc oxide products and paints. Another important mineral is iron, the mining of which was in existence since before the revolution. Mines are found at Oxford in Warren County and near the Dover district.

A large quarry industry is centered at Great Notch where crushed trap-rock is produced for concrete work and roads. Another quarry located at Bloomingdale produce "granite gneiss." Limestone, used as raw material in brick, is fashioned at Port Murray in Warren County.

The most widespread of mineral resources in the state, continued the speaker, is sand. In the southern section quartz sand is used in the manufacturing of glass. One of the oldest state mineral industries is clay. A large part is found in Middlesex County. The clay is used for fire brick, ceramics and other chemical stoneware.

A unique industry and one which New Jersey can claim as being the only state to utilize is green sand marl, stated Mr. Johnson. The product is washed, treated chemically and is used as a water softening agent. Large quantities are found near Raritan Bay.

Another mineral resource is peat moss. A large peat plant is scientifically conducted in Sussex County.

As to the future of state mineral resources. Mr. Johnson foresees the making of metal parts in factories of Northern New Jersey. Other states are manufacturing these parts by the method of compression, he explained. Metallic powders are put in molds and then compressed into the various shapes and sizes required in the finished products.

Mr. Johnson has been with the state department of conservation for 21 years and has held the office of geologist since 1937.

—Paterson, N. J. *Morning Call,* Nov. 30, 1948.

MINERALS-ELECTRONICS-RESEARCH

Since the beginning of time—whenever that might have been—man-kind has willingly or unwillingly been interested in the Earth; willingly out of curiosity and unwillingly out of dire necessity. Today the great army of willing seekers is swelled from day to day by hosts of scientists and laymen who are not content to accept the known but are striving to pass on to the knowable of the Future.

Earth science of today has progressed so far beyond the scope of the Geology of yesteryear that the Economic Geologist must extend his point of view into the fundamental characteristics of all sciences —EARTH SCIENCE.

With the coming of the almost Universal use of the Airways is presented a number of problems seeking solution that tax our present knowledge to the Nth degree. Aeronautical demands have exacted knowledge that the Earth Scientist alone is in position to give. To lay a foundation for the encouragement of the coming generation it seemed fitting to gather around one this datum—skimpy as it must of necessity be.

Since his Montreal days and association with efforts at understanding—partial as it was and is—of fission of the atom, the Writer has striven to maintain a contact of some sort with the march of progress in this intensely interesting aspect of human endeavor. A practical approach has been diligently sought to the acquiring of this means to that end; that is to a source of this knowledge. This year the opportunity came with the writer's meeting with Major H. C. Mulberger of the Army Air Forces: out of this contact has sprung the association of BROWN'S MINERALS with ATOMIC RESEARCH CORPORATION as Mineral Division of Atomic Research Corporation under direction of the writer.

The Major formed the Corporation 15 years ago in Milwaukee to enter the Field of Photography, Electronics and Atomic Research. At the advent of War he went into the Army Air Forces where ample opportunity occurred to continue Research in Aeronautical instruments and the related uses. He has developed a number of aids to instruments' use as well as several new departures in their field.—Color Photography as well as the three dimensional angle, research in the field of Ultra Violet wave lengths for target practice and spotting, also Electronic means of destroying Bacteria in foods and drinks. Altogether the 15 years of these endeavors have made him a very valuable leader in the Constructive Atomic Research Field. ATOMIC RESEARCH CORPORATION is devoted to extensive Exploration in the World of Minerals especially those newly useful and strategic factors that are coming into the products of the Research Laboratory.

Intensive Field Work is under way in search for the Rarer Minerals that are more in evidence atomically than by the usual geologic observation.

Whilst this field work is going on, an integral part of the work will be the collection of typical minerals for the visual instruction of the Student of Rocks and Minerals—this instruction is carried out in the writer's Earth Science Series of Selections, these Rocks grouped into their classes of use.

THE EARTH SCIENCE SERIES is not intended to supersede or disrupt teaching methods but to carry to the Student the human ideas involved in the uses and through the uses to the basic features of each Selection under consideration.

Earth Processes are stressed in order to show their relation to use.

These instruments will come direct from the Laboratory of Atomic Research Corporation.

Fluorescence, atomic and Molecular Research, electronics etc., will be part of each Visible Demonstration.

We are definitely devoted to a greater understanding of the EARTH, asking for criticism we 'Sit at the feet of Gamaliel'.

Frank Ellis Brown
Colorado Springs, Colo.

TWO NEW MEMBERS APPOINTED TO AEC ADVISORY COMMITTEE ON RAW MATERIALS

Two consulting mining engineers, Thorold Field of Duluth, Minnesota, and Orvil R. Whitaker of Denver, Colorado, have been appointed to the Atomic Energy Commission's Advisory Committee on Raw Materials, it was announced Dec. 14, 1948, by John B. Gustafson, Manager of the AEC's Raw Materials Operations Office.

Mr. Field is a consulting mining engineer associated chiefly with the Congdon Office of Duluth and with Case, Pomeroy and Company, Inc., of New York City. He is director of Case, Pomeroy and Company. A native of Pottstown, Pennsylvania, Mr. Field received his M. E. degree from the University of Pennsylvania and did graduate work at Harvard University. From 1942 to 1944, Mr Field was a consultant to the War Production Board.

Mr. Whitaker has had an independent consulting practice in Denver since 1912. He has engaged in professional work in Mexico, Central America, Canada, Cuba and various parts of the United States. A native of Frazeysburg, Ohio, Mr. Whitaker received his M. E. degree from the Colorado School of Mines.

Other members of the Advisory Committee on Raw Materials, formerly called the Advisory Committee for Exploration and mining, are:

Dr. Donald H. McLaughlin, president, Homestake Mining Co., Lead, South Dakota (chairman);

Everette L. DeGolyer, petroleum geologist, DeGolyer and McNaughton, Dallas, Texas;

Wilbur Judson, vice-president and director, Texas Gulf Sulphur Co., New York, New York;

Robert E. McConnell, McConnell Foundation, New York, New York;

Fred Searls, Jr., president, Newmont Mining Corp., New York, New York;

Clyde Williams, director, Battelle Memorial Institute, Columbus, Ohio.

THE MICROMOUNTER

Conducted by Leo W. Yedlin, 557 W. Penn. St., Long Beach, N. Y.

One fascinating phase of m/m mineralogy is the study of mineral inclusions. Hand specimens showing good included crystals are comparatively rare, tho one of the most beautiful of all, rutile in quartz, is available in the stocks of most dealers. But except for large crystals (O. I. Lee of Jersey City, N. J., has a clear quartz with pyrite cubes almost ½ inch on an edge.) the actual form of the included mineral is not often seen or appreciated.

This is not so under the "mike", however. Best viewed by transmitted light the specimen takes on a clarity and life not equalled by anything. Often it seems as if an entire land area is being observed from high up, with houses, steeples, rivers, mountains, and other topographic features.

It is suggested that the phantoms found in quartz, fluorite, calcite, etc., be studied for good micro-inclusions. The faces of the phantom frequently exhibit beautiful crystals. Some of these are quite remarkable. Note particularly quartz from Brazil; fluorite from Illinois and from Cumberland, England; and quartz-hematite groups from Cumberland. These will almost always reward the m/m collector with worthwhile specimens.

Examining our own collection recently we came upon some 24 specimens of micro-inclusions. Some of these had to be polished. Many, however, by reason of cleavage and fracture, were perfect in the rough. It is here, by the way, that the transparent plastic boxes prove their worth. They permit light to enter the specimen from all directions, providing maximum illumination.

We are listing herewith the 24 mounts, with the hope that they will act as a guide to collectors in examining their own material.

Including Material	*Included mineral*	*Locality*
Quartz	Rutile (needles & stout xls)	Minas Geraes, Brazil
Quartz	actinolite	Yancy Co., N. C.
Quartz	pyrite (cubes)	Minas Geraes, Brazil
Quartz	hematite	Cumberland, England
Quartz	hematite	Paterson, N. J.
Quartz	göethite	Paterson, N. J.
Quartz	chlorite	Westfield, Mass.
Quartz	chlorite	St. Gothard, Switz.
Quartz	stibnite (hairs)	Harz, Germany
Quartz	tourmaline	Minas Geraes, Brazil
Quartz	copper	Houghton, Michigan
Calcite	copper	Houghton, Michigan
Calcite*	cuprite (chalcotrichite)	Bisbee, Arizona
Calcite	silver	Houghton, Michigan
Calcite	orpiment	Manhattan, Nevada
Calcite	byssolite	St. Gothard, Switz.
Calcite	byssolite	French Creek, Pa.
Calcite	pyrite	Cumberland, England
Fluorite	pyrite	Cumberland, England
Fluorite	marcasite	Rosiclare, Ill.
Fluorite	hematite	Cumberland, England
Fluorite	quartz	Cumberland, England
Muscovite	garnet	Spruce Pine, N. C.
Muscovite	gahnite	Spruce Pine, N. C.

Hugh A. Ford of New York City, has had some unusual specimens of micro-inclusions. Brazilian quartz, with fine yellow tetrahedral crystals of helvite enclosed. These are quite unique.

The possibilities are endless. Hardly any transparent mineral is without inclusions that can be observed under the microscope.

We have recently returned from a fast 3 weeks at the hunting grounds of the late James G. Manchester, — Ballast Point Hillsborough Bay, Tampa, Florida.[1] Needless to say we collected a great deal of the chalcedony replacing coral. Of interest to the m/m collector is the fact that two of the corals, when broken open, were completely lined with fine drusy quartz crystals which showed brilliant facets under the 'scope. Quartz crystals are not remarkable in themselves. In this case, however, they indicated the fact that they can form under extremely low temperatures — that of sea water.

From Florida, too, comes a specimen of gypsum, very recently formed. This was contributed by T. Orchard Lisle, who stated that it was found in a water main. The crystals are in clusters, clear, sharp and typically monoclinic. Their formation is easily understood by anyone who has suffered the sulphurous drinking water of central Florida towns. The lime and sulphur in the water passing thru the mains have no doubt precipitated as gypsum.

To those of you who have specimens of the Paterson, N. J. zeolites and associated minerals we suggest a careful examination under the 'scope. Superb micro material can be found, including the zeolites, metallic inclusions, and many other worthwhile things.

*Here the needles are red as they enter the calcite. As they go deeper they take on some of the CO_2 from the calcite, and water, and become green — malachite.

[1]Collecting semi-precious stones in Florida, by James G. Manchester, *Rocks and Minerals*, Dec. 1941, pp. 435-454.

We were fortunate in having Dr. and Mrs. Stenbuck, of Mt. Vernon, N. Y., visit us for an evening of mineralogy. The Stenbucks had just returned from a western trip, and were just loaded with loot. Dr. Stenbuck was fortunate enough to enter the mine at Kellog, Idaho. He there came upon a newly opened pocket, of room size, completely lined with glittering crystals of fine cerussite and anglesite, with occasional implanted wires of arborescent silver.

We have never been so fortunate. This sort of thing must be the dream of all collectors. Just imagine crawling thru wet and muddy passages — dull and barren walls — to enter, finally, an Aladdin's cave, glittering with jewels, sparkling under the beam of a miner's headlight. And added to the visual joy, the words from the mine operator: "Help yourself".

A GOOD DAY AT PROSPECT PARK, N. J.

By T. ORCHARD LISLE

I would like to report an exceptionally fine collection day at the Sowerbutt quarry, Prospect Park, New Jersey, late last summer. The visit was made with permission from the owners.

While specimens of interest can still be found in this well-combed locality by any rockhound who is willing to work hard uncovering pockets in the part of the quarry where blasting no longer is made, Sowerbutt has ceased to be a collector's paradise. Nearly all the commercial blasting is now being done in the basalt traprock of the center wall where no minerals can be found — just rock.

It was my good fortune to arrive at the quarry one noon towards the end of August, thirty minutes after a large blast had been made in the North-East wall, where lying over the basalt is a mineralized area about 20 ft. deep. This had come tumbling down and was exposed at one end of the pile.

What a lot of virgin material for a rockhound to work on. I was able to obtain the benefits of my best collecting day there since 1940.

I returned later in the hope that removal of the surface rock by the steam shovel would have exposed additional interesting specimens. But a lot of overlay material had come down and covered the mineralized rocks, and the collecting that day was very poor in comparison. In fact, I went away without a single specimen. Fisherman's luck? The rock pile has since been hauled to the crusher.

Some of the specimens I found on the day of the *first-mentioned* blast are as follows:

1. A 10" by 5" matrix covered with dozens of large and small light brown stilbites, some of which measure one-inch long by half-inch diameter.

2. A geode full of very pale amber-colored heulandite crystals. It broke in several pieces of which one with a cavity has a small salmon-colored ball formed of a mineral unknown to me.

3. Another unknown mineral is a pea-sized drab-colored ball half protruding from a quartz matrix. A cross section of the ball is visible in the same matrix where several have broken.

4. A very attractive specimen is a pseudostalactitic-form of quartz crystals covered with a coating of prehnite and with a sprinkling of microscopic laumontites on top of the prehnite. Another specimen has a prehnite coating but practically without laumontites. Then, a third specimen is almost flat prehnite covered with thousands of microscopic laumontites.

Yet another specimen consists of pseudostalactitic form quartz with a small group of stilbites on which are clusters of laumontites. A fifth specimen of this particular family consists of pseudostalactitic-form quartz with a sprinkling of golden calcite balls — quite a museum

Editor's Note: The above locality is more commonly known by collectors as the Prospect Park Quarry of Paterson, N. J.

specimen. And I also found a larger and heavier geode containing smaller pseudostalactitic-form quartz crystals, but with more than 50 larger, and more golden, quartz crystals, most of them twinned. The calcites are among the loveliest I've seen. A sixth specimen in this family consisted of pseudostalactitic-form quartz crystals sprinkled with prehnite balls.

5. One piece consists of many hundreds of tiny pale amber colored heulandites sprinkled with microscopic laumontites, and an unknown mineral.

6. Part of a geode of dark purple amethyst crystals of very good color. Some are ½" diameter crystals. This was a large cavity of amethysts, but it broke into a number of pieces, and many of the good crystals fell off when chiselling the cavity out of the rock.

7. A specimen of what I think are tiny milk-white natrolites on prehnite with a few water-colored heulandites, plus a few laumontites.

8. A 2½" group of stilbites, half of which are covered with microscopic quartz crystals, which I think is very unusual, even if the piece is not very attractive in appearance.

9. Quartz coated with prehnite balls, and one good-sized clear white calcite crystal, and with laumontites on the reverse side.

10. A 1½" by 1" cloudy datolite crystal, which was one of about 30 crystals of similar size in a big cavity in a very hard and solid traprock mass and too difficult to break.

11. Lastly, there is a specimen coated with a very dark green — almost black — mineral, which might be chlorite. There was a huge cavity of this material — several feet in diameter. The coating is on calcite crystals.

As I obtained about 100 pieces, readers will agree that this is quite a variety of minerals for one man's work on one day. It certainly is exceptional in these days for Prospect Park.

AEC OFFICIALS DISCUSS COLORADO PLATEAU PROGRAM AND CARIBOU MINE

Questions relative to the Colorado Plateau uranium production program and a reported strike of pitchblende in a Caribou (Colo.) mine were directed to David E. Lilienthal, Chairman, and John K. Gustafson, Manager of Raw Materials Operations, U. S. Atomic Commission, at a press conference in Denver on December 17, 1948.

In view of the wide public interest in these subjects and in response to many requests for the text of these questions and the replies to them, the following information is issued supplemental to press conference statements previously prepared by Mr. Lilienthal and Mr. Gustafson:

QUESTION: How important is the uranium production of the Colorado Plateau to the United States atomic energy program?

Mr. Gustafson: While the Colorado Plateau is the only area in the U. S. actually producing uranium, its production is small in relation to total U. S. requirements and to supplies available from foreign sources.

Mr. Lilienthal: It is very small in comparison.

QUESTION: Is it true, as reported in Look Magazine, that the discovery of pitchblende in the Caribou Mine makes the United States independent of imports for uranium supply?

Mr. Lilienthal: That is a gross exaggeration.

Mr. Gustafson: This is an interesting pitchblende prospect. No ore has been blocked out. We hope that it will ultimately become a producer of uranium. There is no foundation, on the basis of known facts, for the statement that this discovery makes the U. S. independent of imports. The magazine itself said, in the last paragraph of the article, that further exploration was necessary to determine both the extent and richness of the discovery.

THE AMATEUR LAPIDARY

HOT ROCKS

By LUCILLE SANGER
Box 133, Green Mountain Falls, Colo.

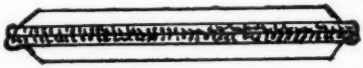
Coloring stones was practiced commercially long before moss agate became plume and the price shot up, and rockhounds today enjoy tinting and coloring those which are clear and changing the color of those which were colored by nature.

The old saying about necessity being the mother of invention is certainly true when it comes to the activities of rockhounds, however, the word "necessity" should be changed in this case, to "urgent desire." Judging from the unusual, not to say peculiar, contraptions we have had the pleasure of seeing in the shops of our friends, the Beryl Girls and the Jasper Caspers (thank D. M. Rogers of Elmhurst, Ill., for these pet names) have even, at times, utilized the kitchen sink.

During the war we became interested in the heating of stones to change the color or bring out hidden color as in the case of the yellow banded Brazilian agate. Much of the material on the subject recommended using an electric furnace and there were none on the market then. We thought of making one ourselves but were handicapped by living in a locality which had only twenty-four hours to the day, a few of them, according to ancient custom, being spent in sleep. We did read that peasants of old Russia and some other countries heat treated stones by the simple method of baking them in bread, but we did not feel justified in breaking the habits of a lifetime and baking bread, even to color stones.

At the time we had on hand some yellow banded Brazilian agate and some golden Tiger Eye with which we wanted to experiment, since we had heard that the red Tiger Eye was made by heating the golden. Having some of this material cut and polished into cabochons, we decided to forget about fancy furnaces and heat it the best way we could.

We placed a round pad, made of screen wire and a thin sheet of asbestos bound together with tin, over a gas burner on the kitchen stove. Then, taking an ordinary pie tin, we placed the cabochons in the bottom of it. Then, over that pie tin, we placed another just like it, but upside down. This formed an oven. See drawing.



PIE TIN OVEN

Then we lighted the gas burner with a flame as low as we could get. After the stones had warmed up we turned the flame up a little. We repeated this two or three times and then left them to their fate. After a time, when we felt that there had been time for something to happen, we held a flashlight close and with a potholder in the other hand, we hastily raised the top pie tin and took a quick look to see if the colors had changed. We looked two or three times the first time we heated stones, but now we just turn on the heat and leave them for quite a while and when we do look at them, the change has been accomplished. When the color is suitable, the burner is turned off and the oven left as is for the stones to cool off slowly.

The only stone we ever lost by this method was a heart pendant of Brazilian agate with a V band down the middle. Against good sound advice, I heated this stone immediately after cutting and polishing instead of waiting at least a week for it to dry out. It promptly cracked down the middle. Another thing to remember is to raise and lower the lid very quickly as the stones are likely to fracture when the cold air strikes them. And always remember to heat only polished

stones. Do not use this method on slabs that are going to be cut and polished later as heating makes the stone brittle and there is often great difficulty in working it up due to the brittleness.

The dark color can be drawn from such stones as smoky quartz and some of the hard stones and others made darker and some colors changed. It is also interesting to heat the brown and yellow agates and jaspers to see if the color of that particular piece can be improved.

This method leaves much to be desired from a scientific standpoint, but it does the trick, which is to change the color or bring out latent color and it is a lot of fun.

Eleventh International Salon of Nature Photography Announced

HOBBIES, the Magazine of the Buffalo Museum of Science, will hang its Eleventh International Salon of Nature Photography from May 17 through June 20 in the Central Hall of the Buffalo Museum of Science, Buffalo, N. Y.

There will be two sections — Monochrome and Color, the latter to include multi-color prints and 2 x 2 color transparencies (commercial processing acceptable). A cordial invitation is extended to all nature photographers to submit their four best entries in either or both sections that fall within the following classifications: Class 1, Animals—domestic, wild, Class 2, Birds and Nests; Class 3, Plant Life—trees, shrubs, flowers (except formal pictorial arrangements), fungi, etc.; Class 4, Scenery—geological, seasonal, gardens, clouds, etc.; Class 5, Miscellaneous—fish, insects, reptiles, amphibians, frost forms, tracks, etc.

Three awards will be given in each class in each section from which the best, second best, and third best will be selected. Accepted prints will be hung under glass, and accepted slides will be projected for public viewing at stated intervals throughout the Salon.

Complete conditions appear on the entry form, which will be sent on request. A non-returnable entry fee of one dollar ($1) is required from each entrant for each section entered. The last day for receiving entries will be Saturday, May 14.

The Salon will be conducted in accordance with the salon regulations of the Photographic Society of America.

Enjoys Micro Mount Section!

Editor R & M:-

In the past you asked readers whether or not they enjoyed the section on micro mounts. I certainly do. I am not a micro mounter as yet but I am gradually getting started on it.

Just another word about *Rocks and Minerals*. I once saw a criticism that there were too many ads in it. I actually enjoy mulling over the ads as much as reading the articles. Well, almost as much!

Frank W. Smythe, Jr.
Memphis, Tenn.

Dec. 30, 1948.

The 4 Rockies!

Editor R & M:-

I must write to tell you about a wonderful trip we made this year when we went to Oklahoma City, Okla., to visit some collectors.

We visted the Langfords of Oklahoma City, who have a very nice collection. They took us to many collectors, and we also did some collecting. It would take pages to tell all about the wonderful things we did and how nice to us were the collectors visited. Boy, I sure am glad that my hobby is mineral collecting! I have a nice collection, too, and many friends all over the world. Mother, Dad, and sister Rosalie all enjoy mineral collecting with me so now we call ourselves the "4 Rockies".

I owe you many thanks because you helped me so much with this hobby.

"Rocky" Roy Grossman,
Batesville, Ind.

Dec. 13, 1948.

R & M A Big Help!

Editor R & M:-

To show you that I am trying to promote interest in mineralogy and lapidary work in Tennessee, I am sending you a page from our Tennessee Eastman Corp. paper ("Flamm has fun—he's a lapidary", title of an interesting write up.—Editor).

I sincerely believe that my membership in the Rocks and Minerals Association has helped me to a better understanding of the art of rock hunting and has brought me in contact with new friends. Through the medium of *Rocks and Minerals*, I have located many interesting localities.

Paul F. Flamm,
Kingsport, Tenn.

Nov. 25, 1948

Can't Afford To Miss An Issue!

Editor R & M:-

I enclose check for $3.00 as renewal payment for another year. Don't let me miss an issue of *Rocks and Minerals*—I can't afford to!

Fred L. Mills,
Fort Worth, Texas

Dec. 13, 1948.

COLLECTORS' COLUMN

Conducted by A. CAL LECTOR

This column, which began with the Sept.-Oct., 1948 issue, is of special interest to beginners in mineralogy, as we comment briefly on one or more of the common minerals. In the last issue we talked on the amphiboles. This time we will take up arsenopyrite which is the most common arsenic mineral known.

Arsenopyrite

Arsenopyrite is the chief ore of arsenic. Its name comes from *arsenic + pyrite;* it is known also as arsenical pyrites and as mispickel (an old German word of doubtful origin). The name *pyrite* comes from the Greek word for *fire,* and alludes to the sparks given off by friction or hammering, a common phenomenon of some minerals.

Arsenopyrite is a silver-white, heavy metallic mineral but on long exposure to air it becomes so black that its identity is completely hidden and it must be broken open to reveal its true color. A distinctive feature of the mineral is its garlic odor, which is easily noted when the mineral is hammered. This odor is so strong that when the noted (but long abandoned) arsenopyrite mine near Carmel, Putnam Co., N. Y., was once visited by some young girls (all collectors), they soon began calling it the "garlic mine", a name which has persisted to this day. One doesn't have to hammer the mineral to get its odor, a thin splinter placed on a hot stove, or heated in any other way, will soon give off its garlic odor.

Arsenopyrite is a very common mineral and found all over the world. It is especially common in cobalt, copper, gold, iron, nickel, and other deposits. A few deposits throughout the world are worked exclusively for arsenic but the metal, commercially, is obtained as a by-product of other mines, chiefly copper. The chief use for arsenic is in the manufacture of insecticides, and as weed and vermin killer.

The mineral is found, as a rule, in masses associated with quartz which often form nice specimens. This is the occurrence at the arsenic mine near Carmel, N. Y. Chalcopyrite, hornblende, pyrite and other minerals are often found with arsenopyrite.

Very fine crystals of arsenopyrite occur at Franconia, N. H., in gneiss associated with chalcopyrite — these crystals have been called danaite (after J. Freeman Dana who first made known the Franconia locality); at Deloro, Ont., Canada (in quartz veins); at Munzig near Meissen, Saxony, Germany, associated with garnet, pyrite, and sphalerite; at Sulitjelma, Norway; at Redruth, Cornwall, England; and elsewhere.

Many dealers carry in stock nice specimens of arsenopyrite as the mineral is by no means rare. Specimens may be obtained in masses (either pure or associated with other minerals), crystallized, or as loose crystals. Contact a dealer so that you may add two or more specimens of arsenopyrite to your collection.

A Good Motto!

Editor R & M:-

Thanks for your note on the fluorescent tremolite locality of St. Lawrence County, N. Y., and for the name and address of the collector whom I wanted to locate.

Here is a good motto for you—"Service by the mile with a smile!"

Wm. J. Brookes,
Hempstead, N. Y.

Dec 30, 1948.

Like A Letter From Home

Editor R & M:-

You will find $3.00 enclosed as renewal payment for 1949.

Receiving *Rocks and Minerals* is like getting a letter from home. We always look forward to its arrival.

The articles by H. W. Slocum were unusually interesting. We enjoyed them very much.

H. W. Porter,
Pepperwood, Calif.

Dec. 22, 1948

QUESTIONS & ANSWERS

QUES. Please give me the address of Linde Air Products who manufacture synthetic boules? E. H., Queretaro, Mexico.

ANS. 30 E. 42nd St., New York, N. Y.

QUES. Please give me the names of some very colorful minerals? I use these minerals in miniature gardens and as I am not very much informed do not know exactly what to ask from dealers. Mrs. C. I. D., Greens Farms, Conn.

ANS. Here are a few names: Amazonstone (green), azurite (blue), almandite garnet (deep red), amethyst (purple), biotite (black), calcite (white), cinnabar (brick red), cyanite (blue), epidote (pistachio-green), malachite (green), precious opal (play of colors), rhodonite (pink), rose quartz (pink), siderite (brown), sulphur (yellow), zincite (red). When ordering any of these minerals, be sure to ask for the color stated.

QUES. Will you please give me the names and addresses of some amateur gem cutters in Delaware? G. W. K., Delaware City, Del.

ANS. We do not know of any.

QUES. I recently acquired a nice green serpentine specimen, labeled as coming from The Lizard, England. Where is this locality? R. H., Harrisburg, Pa.

ANS. This is a peninsula jutting out from the southwestern part of Cornwall into the sea (about 25 miles further to the west is Land's End, the most Westerly point of England). The Lizard is famous for its serpentine cliffs which are beautifully veined and colored and in varied shapes, due to action of the sea waves.

QUES. I have a nice specimen of green aventurine labeled only "India". Can you give the locality in India from which the specimen came? A. D. E., Portland, Ore.

ANS. Bellery District of Madras. This locality was written up in the May, 1945, issue of *Rocks and Minerals*, p. 219.

GEOLOGICAL OBSERVATIONS

PLANTS GROWING ON ROCK WALLS

On my many field trips throughout New York and other states, I have frequently come upon vertical rock walls in quarries, road cuts, etc., which at times have produced interesting minerals. On quite a number of occasions, however, these rock walls would attract my attention for another reason, not for their minerals or rock formation, height or length, but because — on the hard, bare face, plant life would be visible, here and there. One day I took time out to investigate this occurrence. I saw that the tiny plants were growing out of equally tiny mounds of earth which were lying in small cavities of joints or fractures in the rock. Minute seepages of water kept the earthy mounds moist and this was why the plant life was able to flourish.

The presence of water in a cavity is easy to explain — it just seeps through the joints or crevices of the rock, even on hot days (although rains would fill a cavity to overflowing), The earth or soil with the plant life might (or part of it) come through with the seepage but the more logical explanation is that they were blown into a cavity by winds.

The next time you examine a rock wall, devote a few minutes to the plant life that may be present. You, too, might find them of interest.

Peter Zodac

Can't Be Beat!

Editor R & M:-

Enclose find $3.00 as renewal payment for the best mineral magazine on the market. For mineral occurrences, mineral news, dealers ads and other items dear to a collector's heart, *Rocks and Minerals* can't be beat.

Bill Knight,
Merion, Pa.

Jan. 7, 1949.

Never Been Led Astray!

Editor R & M:-

Rocks and Minerals gives my friends and me many hours of pleasant reading and helps us to plan many trips afield. The directions or locations mentioned in the magazine have never led us astray.

Floyd Faux,
Bethlehem, Pa.

Dec. 16, 1948.

CLUB AND SOCIETY NOTES

ATTENTION SECRETARIES—If you want your reports to appear in the May-June issue, they must reach us by April 20th—The Editor.

Chattanooga Rocks and Minerals Club

The January 5th, 1949 meeting was held at the University of Chattanooga where Prof. B. K. MacGaw, president of the Club, showed colored slides illustrating Physical and Historical Geology. Several members brought in specimens for identification and discussion. Mr. T. W. Brown became the newest member. The next meeting will be held Feb. 2nd, at the University.

Geo. C. Olmsted
Pub. Com
Signal Mountain, Tenn.

Chicago Rocks & Mineral Society

A top program was experienced by the Chicago Rocks and Minerals Society, 2650 W. Peterson Ave., Chicago, Ill., at their last meeting which was held December 11th, 1948, at 8:00 P.M.

R.C.L. Atomic Blinker Survey Meters containing Geiger counters, were clacking away the invisible atomic energy waves from rock containing Carnotite, Uraninite and Pitchblende. Rockhounds who had collected in Utah and Arizona brought in the specimens.

Comedy was exhibited when Herbert Grand-Giiad, editor of the society's "Pick and Dop Stick", refused to take back any piece of rock which did not register the nuclear radiation. Lloyd G. Shore, guest speaker and demonstrator for the evening, had quite a time with Herbert.

The Radiation Counter Laboratories, Inc., 1844 W. 21st Street, Chicago 8, Ill. furnished the survey meters and Mr. Lloyd G. Shore, free of charge.

Members of the Chicago Rocks and Minerals Society were guests of the Chicago Marquette Society's annual open house meeting held Saturday, January 8th, 1949, in the lecture room of the Chicago Academy of Sciences. Many out of town representatives of other mineral societies also were in attendance.

Messrs. Poole, Greenlee and Bussey highlighted the event with a most excellent display of gemstones, minerals and fluorescent rocks. In addition, there was a fine collection of color slides of mountains and rare rock specimens shown, after which refreshments were served. "Pop" Fleener, Ben Hur Wilson, James Montague and the *Past and Present Presidents, Messrs.* Anderson and Anderson of the Midwest Federation of Geological Societies, soon became the centers of attraction and surrounded by huddled chatters. The Scanlon family contributed much to the success of the get-together and were almost forced to crack the whip and disperse the guests who were too absorbed in their discussions to realize the lateness of the hour.

In a recent meeting the Chicago Rocks and Minerals Society elected the following new officers:

President—Dr. Bernard C. Kolter
Vice-Pres.—Isaac Coldevin
Recording Secretary—Marie Holtz
Treasurer—Louis Holtz
Corresponding Sec'y.—Helen L. Cooke
Curator—George C. Anderson
Editors—Herbert and Oriol Grand-Girard

Helen L. Cooke, Pub. Chairman
2952 N. Lavergne Ave.
Chicago 41, Ill.

Pomona Valley Mineral Club

The December meeting of the Pomona Valley Mineral Club was held in the Chemistry Building of Pomona College. The speaker of the evening was Mr. Gene Linville of Hollywood who spoke on "Gems".

Mr. Linville opened his lecture by stating that of the 3,000 known minerals, approximately 35 or 40 can be classed as gems. These can be broken down into two classes—precious and semi-precious. The precious stones must have three qualifications — beauty, rarity and durability. Mr. Linville then gave the following things a jeweler tests in stones, using the blackboard to illustrate: composition; specific gravity; hardness; crystal system; dispersion; refractive index; double refraction; and fresnel reflectance. He explained in detail the above in the diamond, and the compared them to the sapphire and silicon carbide.

He then discussed the element titanium, which is the fourth most abundant element on earth. He talked of its many qualities, including its strength, lightness and the fact that it is rustless. He also spoke of the new synthetic rutile.

Mr. Linville concluded this interesting lecture by answering various questions the club asked. He displayed a beautiful emerald crystal in matrix, which the club examined at the close of the meeting.

Verna N. Weist
Publicity Chairman
322-A E. B St.
Ontario, Calif.

The Cleveland Lapidary Society

Meeting was held in the Mineralogy and Geology Building, Case Institute of Technology, Dec. 7th, 1948.

Jim Farrington gave a most interesting and instructive talk on Turquoise. Jim has spent

considerable time in the Southwest (Arizona and New Mexico), working with lapidaries in this region. He has gained much of his information from people who know from long experience, handling this material. Most of the older cutters learned some new angles.

The principal talk of the evening was given by Bud Brehm of Warren, Ohio, a commercial lapidary. He projected a number of color pictures showing his trip through the West and South. He described each location as he went along. He also projected a number of cut stones on the screen, demonstrating the possibilities of this method of presenting stones to a group of people to be discussed and analyzed.

The popularity of the meeting is attested by the number and enthusiasm of those present —our society numbered 65 before the meeting and 10 new members were taken in — 125 attending the meeting which was a record crowd. Our meeting room was completely filled and the officers are frankly worried how we are going to continue to handle the increases. We have moved four times to get larger rooms and now we are at a loss to know where to go.

The next meeting is scheduled for January 4th 1949 at which times Charles Luthern will demonstrate faceting Richard Moriarity will discuss Garnet, the birthstone for January.

REPORT

The first exhibit by the Cleveland Lapidary Society, Dec. 18, 1948 to Jan. 15, 1949.

27 Exhibits out of 71 members.
16 Single cases of gems displayed.
2 Double cases of gems displayed.
2 Cases of equipment displayed.
1 Case of books displayed.
6 Exhibits open to public 21 hours 9:30 A.M. to 6:00 P.M. on 15 days. 9:30 A.M. to 9:00 P.M. on 6 days.

Estimated retail value of display $100,000.00.
Estimated number of persons viewing display 3,000.

REACTIONS

The Library Publicity Director, Mr. Young, expressed great pleasure with the display, the well arranged exhibits and the small amount of assistance needed from the Library staff.

The Library gave valuable assistance in the preparation of display cards for our exhibit and which were given to the Society for its historical records. The Library reported there was more interest shown, more inquiries and more requests for books than on any other display held in the Library.

Mr. Young stated that he would be very happy to have a repeat performance and was sorry that we could not leave the display in the cases for another month.

Our relations seem to be mutually agreeable and we believe we have gained much for our Society with the Library and the public.

MEETING OF JAN. 4th. 1949

We have scored again! The record crowd, eight new members signed up which brings our membership to eighty-six. We began the year with forty-five members so that we have doubled our membership in less than one year.

At the January 4th meeting Richard Moriarity gave a fine talk on Garnets. The principal entertainment was provided by Charlie Lutheran, who brought a lap and faceted a stone. To make the event more interesting the crystal which he faceted had been prepared in the Brush Laboratory by Dr. T. J. Turobinski, President of the Society. The stone was made by dissolving titanium oxide in glass. This combination gives a very high index of refraction (1.9) and makes a very fine stone when properly faceted. At the end of the meeting the stone which had been faceted was given to one of the members as a door prize.

The next meeting is scheduled for Tuesday evening, February 1st, 1949, at which time Mrs. Beattie will talk on Amethyst, and Mr. E. A. Inkley will show pictures of his trip out west through Colorado, Wyoming and California.

Persons interested in lapidary work and allied arts are invited to attend and get acquainted with the members of our Society.

John M. Heffelfinger, Sec.,
7619 Redell Ave.,
Cleveland 3, Ohio

Passaic County Gem and Mineral Society

At a regular meeting of the Passaic Mineral Club, held on Feb. 3rd, 1949, a new name was approved by some 20 members, also by-laws, with new officers being elected. The following are the new officers of the Passaic County Gem & Mineral Society (as the club is now called):

President—Howard J. Hewitt (prospector).
Vice-Pres.—John J. Stewart (gem cutter).
Sec-Treas. J. Hanzel.

Most of the members are ex-G.I.'s of Stewart's Gem Cutting Institute, 571 Main Ave., Passaic, N. J.

Several field trips were made in 1948 to Connecticut, Maine, and New York. Many trips for 1949 are planned. Regular meetings are held at the Institute on the 1st Tuesday of every month except July and August. All amateur cutters, geologists, mineralogists, and rockhounds are welcome—12 years of age or over.

Special lectures and classes are to be conducted throughout the county for young boys and girls.

Howard J. Hewitt, Pres.
142 Carroll St.,
Paterson 1, N. J.

East Bay Mineral Society

The first four months of the 1948-49 season of the East Bay Mineral Society were highlighted with rewarding field trips and its members look forward to the new year to be filled with bigger and better accomplishments.

Among the rare trips the society has enjoyed, all were within a few miles of home.

Jasper hunts netted beautiful variety in color and design, some rare Orbicular.

More than one safari was made into Quicksilver Mines, where members were able to obtain fine specimens of Cinnabar, Native Mercury, Calomel, Serpentine and Eglestonite.

One pilgrimage into the mother lode country brought forth Plume Agate and Plume Opal.

A very interesting trip was made into the Onyx country where fine Travertine samples were obtained which polished beautifully; also Aragonite crystals.

A trek to the Berkeley Hills netted a good crop of Nodules. Another day at the seashore produced Opalized petrified wood, Quartz, fossil bones, shells and a specimen or two of Jade.

Under the leadership of our amiable and indefatigable president, Millard V. Moore, the members have heartily enjoyed these field trips and 1949 should see them all busy a-cutting and a-polishing for many months to come.

We could go on and on and not run out of material, cutting material, that is.

(Trip to Berkeley Hills)

The field trip of the East Bay Mineral Society on Sunday, January 9th, 1949, was a gay and remunerative one under the able leadership of President Moore, Secretary Mallon, and Frank Wilcox. A caravan of approximately forty cars wound its devious way up the snake like Fish Ranch Road, with its ultimate objective, "Grizzly Peak", high a-top the Berkeley Hills. As there was snow on the hills not far away, the morning air was clear and cool. A brisk breeze urged us on to "The Place", a steep ridge where hearty digging would produce Berkeley Hills Nodules, and possibly the rare Iris type, much prized by cutters, one of the few known localities in the world for this particular Nodule. Lucky finders soon turned up specimens ranging in size from small pebbles to big cocoanuts, giving promise of lovely pictures when cut or when sliced wafer thin, a glory of Iris hues.

The scene was one of animated activity and was amusing to behold. As a fresh and eager Nodule hunter approached the crest of the bluff he was greeted by the noisy welcome of some seventy Rockhounds busily digging for the prized Nodules. Some were fanning the air with their arms and stamping the ground with their feet. As the sunlight caught the glint of the picks and shovels in action and thus presented a picture in silhouette of the Nodule hunters in various mode of dress: jumpers, jackets, wooly slacks, over-sized overcoats, mittens, fuzzy caps, and Tam-O-Shanters. Observing this animated scene, the writer's thoughts flashed back a hundred years to tales of Gold Rush Days of '49.

Those that had been sufficiently warmed up by now from the digging, rested for a moment to admire the picture of sublime beauty stretched below. It was possible to see the Farrolone Islands 30 miles out to sea, the blue bay spanned by tow bridges, and San Francisco looking like a field of sparkling jewels. To the right Mount Tamalpais was a glorious sight, presenting a picture of a royal purple robe draped over the sleeping Indian maiden vividly outlined against a brittle azure sky, and to the east beautiful Mount Diablo, covered with an ermine cloak of snow.

Hungry and happy our caravan then moved on to a "MINERALS UNLIMITED" at 1724 University Avenue, Berkeley, headquarters of our member hosts, The Scott Williams and David Grigsbys, who had graciously prepared steaming hot coffee which was consumed with lunches brought by their guests.

It was warm and friendly and the fine display of minerals was truly *unlimited*. These boys really treated their guests in a splendid manner and also gave away coveted specimens as door prizes.

It was a perfect way to finish a perfect day.

Gordon White
Corresponding Secretary.
P. O. Box 1196
Oakland, Calif.

Southwest Mineralogists

Mr. Charles S. Knowlton, well known collector of Garnets, was guest speaker at the January 10th meeting of Southwest Mineralogists Inc.

Mr. Knowlton started collecting minerals about fifteen years ago, and decided to specialize in Garnets. Many interesting facts were disclosed including the fact that all colors and shades but blue have been found.

Many fine specimens from his collection were on display. To date Mr. Knowlton has Garnets from almost every county in California, and all but eight states and a few foreign countries. In his collection are two beautifully hand carved figures of Garnet.

Mr. Trombatore, our show chairman, announced that April 16 & 17, 1949, would be the dates for our 12th annual show. The show will be held at the same place as last year, The Masonic Temple at 41st Place and Figueroa, Admission free, Public invited.

Mr. Green announced the January field trip will be to Gem Hill near Rosamond, where gem quality Bloodstone has been found.

Connie Trombatore
Corr. Sec'y.
338 Pomelo Ave.
Monterey Park
California

Feather River Gem & Mineral Society

Lovely decorations in traditional Christmas colors, highlighted by two birthday cakes, made the December 16 potluck supper of the Feather River Gem & Mineral Society of Oroville doubly delightful.

A large fortune cake honoring retiring president and founder, Chas. A. Bush, and Mrs. Jessie Clough, whose birthdays fell on this date, was baked and decorated in a professionally beautiful manner by Mrs. Alma Hogge. It revolved on a "Happy Birthday" playing spindle while the honorees tried to blow out all the candles with a single breath. (Mr. Bush found the wedding ring in his piece of cake, and Mrs. Hogge immediately asked when we should have his wedding shower. He has been a widower for more than 20 years!)

A smaller cake was shared by two "pebble pups," Dixie Rankin and Gordon Clough, whose birthdays also fell in December.

Many beautiful and interesting specimens were on display at this meeting. Some were rare including a "miners' bird's nest." Don Parker showed his first attempts at jewelry setting, which were most successful; yet he's been cutting and polishing but for a few months. Charles Bush raffled off a home-made lap wheel for the benefit of the Club, and Art Parker won it.

This was election night, and results are as follows: F. E. (Red) Rankin, president; Don Parker, vice-president; Mrs. Iva Foster, secretary; Chas. Andrews, treasurer; Lee Reeves, Arthur Mitchell and Art Parker, directors.

At the December 9th meeting, club members were shown Wm. Pitts' slides. Since their immediate return was requested, the contemplated special showing of these slides to neighboring clubs and other interested persons had to be foregone. Don Parker paid the final bid at Scotch auction to obtain a chunk of Oregon moss agate donated by F. E. Rankin, and the Rankins were presented with a tasty cake embellished with tiny tin cooking implements, for it was the eve of their tenth wedding anniversary.

Eight cars full of field trippers, including six members of the Napa Valley Rock & Gem Club — president and secretary, Mr. and Mrs. Neal Gardner of Napa; Mr. and Mrs. R. D. Kinsey of Vallejo; and Mr. and Mrs. Frank Wilson, who have recently moved to Paradise —made a successful foray on the dumps of the Surcease Mine on November 14. The watchman described various mining processes to interested persons, and explained that gold, tungsten, and copper had been mined there. Then the party went over near the old Welles Hotel and Stage Station at Yankee Hill and found clear and colored quartz crystals and opalite or chert. This trip was under the leadership of chairman F. E. Rankin and Chas. Andrews.

Kodachrome slides of their recent trip into Gerlach, Nevada, and vicinity were shown by Cookie and Lee Reeves at the Nov. 23 meeting of the Club. They did not find thunder eggs where they had been told to hunt, but they did discover an area of approximately 200 square acres covered with mounds of varying sizes. They took pictures of them individually and collectively, and showing internal and external structure. At the first town they hit following their find, they asked just what the bumps might be, and residents informed the couple that they were "tufa mounds."

Until further notice, Club meetings will be held at Dunstone Memorial Hall at Wyandotte (Oroville suburb) at 8 p.m. on 2nd and 4th Thursdays. Visitors are always welcome, and there's always coffee and —! Vice-President-elect Don Parker, who is program chairman, promises something interesting and entertaining at each meeting.

Adeline Rankin, Sec.
Rt. 2, Box 2105,
Paradise, Calif.

Imperial Valley Show

The Imperial Valley Gem and Mineral Society and the Imperial Lapidary Guild will hold their 3rd annual gem and mineral display in the Junior College auditorium, West Brighton Ave., El Centro, Calif., on April 16 and 17, 1949.

The display will be open to the public from 9:00 a.m. to 10:00 p.m., on Sat. April 16th, and from 12:30 p.m. to 7:00 p.m. on April 17th

Other clubs have been invited to enter exhibits and so hopes are high that this display will be the largest and best we ever had.

Mrs. M. E. Pratt,
Box 1666
El Centro, Calif.

Puyullup Gem & Mineral Society

A regular meeting of the Society was held on Fri. Jan. 14, 1949, and the following officers were elected:

President—J. E. Boone
Vice-Pres.—W. M. McAllister
Sec-Treas.—Mrs. Vie. Smith, 507-16th St. S. W., Puyullup, Wash.
Federation Director—C. H. Robinson, Sr.

Several scouting field trips have proved that there is a wealth of good minerals near here such as agates, petrified wood, fossils, too, and last but not least, cinnabar crystals. We intend to locate various mineral occurrences now covered by a dense growth of underbrush. On a scouting trip made by Mr. C. H. Robinson, Sr., Jan 15, 1949, to one of the old cinnabar occurrences, nice micro mount size cinnabar crystals were found around one of the old shafts. The owner of the property has given

the Society permission to hold a field trip there this coming spring.

The Society meets on the 2nd Friday of the month at Boone Cafeteria in Puyullup.

C. H. Robinson, Sr.
623½-16th St. S.W., Puyullup, Wash.

Texas Mineral Society

Mr. Otis Dozier, one of the leading artists of the Southwest, gave one of the most interesting and informative illustrated talks that this Society has ever had the privilege of hearing and seeing. Mr. Dozier had beautiful colored slides of various agates and rocks and pointed out the abstract pictures which the artist sees in them. The coloring of the agates and other minerals is very unusual and is duplicated by artists to obtain unique coloring for their own pictures. Colors found in agates and minerals can be found in no other place.

"Rocks from the Artists Viewpoint" will be long remembered by the members present at the meeting.

Mr. Dozier is one of our most active members in the Texas Mineral Society.

The meeting was held at the Baker Hotel, Dallas, Texas, January 11, 1949.

Ralph D. Churchill
2003 Republic Bank Bldg.
Dallas, Texas

Gem Stone Collectors of Utah

On Dec. 9, 1948, we held our monthly meeting and our annual competitive display. We had six classes with a winner in each and a grand award of one of the six. All other displays received a special award ribbon.

Each member present was given a ballot and instructions. One vote for each class was granted the ballot holder. By having all members present being the judges, no complaints could come forth.

The winners of the six classifications were:

Cabochons—Sidney H. Hardy of Bingham Canyon, Utah.

Facet Stones—C. L. Pettit of Woods Cross, Utah.

Slabs—B. D. Bennion of Salt Lake City.

Jewelry—T. Frank Nelson of Salt Lake City.

Ornaments—B. D. Bennion of Salt Lake City.

Best Utah Collection—Kenneth Stewart of Salt Lake City.

Mr. Bennion was awarded the grand award for his ornaments. He had several items, namely butterflies of Utah's flowering obsidian and several carvings and spheres Outstanding was a frog from variscite and probably the largest sphere ever cut from variscite.

Of course all entries had to be the work of the member.

Election of officers for 1949 was held.

President—Kenneth O. Stewart, 67 So. State, Salt Lake City.

Vice-President — Mrs. Geraldine Hamilton, 1784 Redondo Ave., Salt Lake City.

Secretary—Grant Steele, 334-4th Ave., Salt Lake City.

Treasurer—Mose Whitaker, 759 So. 18th East, Salt Lake City.

It was interesting to find out that better than 25% of the paid up membership were women. We have 60 members, i.e. paid up, and a large percent have equipment or have it available to work on. Four of the ladies have a shop of their own and by their own efforts.

Kenneth O. Stewart
67 So. State St.,
Salt Lake City 1, Utah.

Pacific Mineral Society

Mr. William B. Sanborn, teacher of Geology at Claremont College and Ranger-Naturalist at Yellowstone National Park, was the speaker at the January meeting of the Pacific Mineral Society, Inc. His subject was "A Kodachrome Trip through the Yellowstone Back Country." First he showed us views along the various routes to the Park, including other National Parks and Monuments, equal in grandeur and magnificence to Yellowstone. There was Montezuma Castle in Arizona, Cliff dwelling of by-gone Indians; the famed Oak Creek Canyon; a view of winter in Grand Canyon; the majestic Tetons; Crater Lake; a very distinct picture of the faces on Mt. Rushmore, taken with a telephoto lens (as were some of his other pictures); Shoshone Canyon with its unique rock formation; and a number of other noted places — all breath-taking views of the wondrous works of nature.

Arriving in Yellowstone, we were shown the many colorful, large and small, geysers in the Norris Basin; some that spout regularly and others more temperamental; some that reached a height of 150 to 200 feet and others only a few feet. "Old Faithful" is not the largest one, nor does it spout regularly, as many people think, but at 35 to 80 minute intervals.

Mr. Sanborn then took us into the back country to see the famous petrified forest, where geologists have found as many as twenty fossil forests, one above the other, caused by volcanic eruptions of cinders and dust which covered the existing forest. Then another one grew and in time was again covered up, until twenty of these cycles are known to have occurred. During this time the conditions of the country changed markedly, for the magnolia trees which were found required a warm climate, while the pines and sequoias needed a cold one. Most of these trees are in a vertical position. At one time amethysts lined the inside of some of these trees, but they have become quite rare since 1925. There are not many minerals found in the Park, and of course no collecting allowed, but the phe-

nomenal geology of the region will always be of absorbing interest.

Mr. Sanborn is outstanding in his vast fund of knowledge of the Park and in his enthusiasm in his subject. He is an excellent speaker, keeping us spell-bound and "carrying us away" on a magic carpet to this marvelous country.

Mrs. O. C. Smith
Bell, Calif.

New York Mineralogical Club

Columbia University (Schermerhorn Building, New York City, Wednesday, December 15, 1948

Mr. Gilman S. Stanton delivered a memorial to Captain Thomas I. Miller who died May 27, 1948, at the age of 93. Captain Miller was interested in mineralogy, microscopy and photography and had prepared more than 500 micro-mounts The luminescence, phosphorescence and radio-activity of minerals specially interested him, and a photograph and radiograph of a cyrtolite specimen of his was published in the guide to the XVI International Geological Congress. Many radiographs made by him were on exhibition at the reception given to Madam Curie by the American Museum of Natural History and this club.

Mr. Leo Yedlin brought to the attention of the Club a new book "Minerals of California" by the Division of Mines, price $3.00. It is an excellent book giving the history of mineralogy of California and describes 638 minerals.

The speaker of the evening was Dr. George W. Bain who spoke about the rich central African mineral belt of Rhodesia and the Belgian Congo. This area which is a rich source of copper, lead, zinc, cobalt, tantalum, tin and uranium is located on "High Africa", a table land which is a flat peneplane with few monadnocks. The mining area is along an arc of folded strata. The Northern Rhodesia ore deposits are found in the lower Roan series and are always associated with monadnocks. At Broken Hill there are veins of bornite along fractures in the arkose and quartzite. There are also veins where specularite is first deposited, then botryoidal pitchblende with the center of the vein being filled with siderite. Many excellent specimens of descloizite, cuprodescloizite, hopeite, parahopeite vanadinite, smithsonite, cerussite and pyromorphite have been found there.

In the Belgian Congo the Katanga ores occur in the Upper Roan series (Serie des Mines). There has been a series of overthrusts and the ores occur in kleppe. At Chinkolobwe, which is an open pit operation, torbernite meta-torbernite, uraninite, becquerelite, cobalt sulphides, dark green malachite and chrysocolla occur.

The cassiterite deposits are in the Muva schist which weathers and forms stream tin. Some mining is also carried on for lode tin.

The talk was very well illustrated with Kodachrome slides.

Purfeld Kent, Secretary

The Queens Mineral Society

The Society held its first meeting of the year on Jan. 6th, and it was a pleasure and a privilege for the members to listen to our guest speaker, Mrs. J. Hannaford, who spoke on the "Story of Diamonds".

Mrs. Hannaford most aptly held the attention of all present with her excellent presentation of the historical phases of the gem diamond, replicas of the world famous stones being employed to illustrate their prize and color. We were surprised to hear that it was considered to be a good yield to obtain 4½ carats of diamonds from 35 tons of rock and further information revealed that only 25% of the stones would be suitable for use as gems. The other stones would be used in various industrial applications such as diamond dies for the drawing of wire, core drill bits and a multitude of other applications in the manufacture of automobiles and precision parts of various kinds.

Mrs. Hannaford stated that it was not unusual for a reduction of 50%, or more, in the weight of the rough stone to take place in producing a gem stone. Some of this material is utilized in making up smaller gems, and as a polishing, or cutting agent in the form of diamond dust. The high degree of skill required in cutting and cleaving diamonds, as well as the detailed study and planning preparatory to such an operation on a large or rare specimen was fully described. We all had the pleasure to view diamonds of various color shades as well as excellent crystal specimens. Illustrating some of the industrial applications were samples of diamond, a diamond die, drill core head, etc.

The desirability of the Brazilian diamond for industrial uses, is primarily due to their tough knotty structure and secondly due to their cost being lowered because of inclusions and lack of brilliance which in turn does not make them desirable as gem stones.

Mrs. Hannaford concluded her enlightening talk by projecting "on the scene" shots of diamond mine operations and an "aerial shot" of the famous Kimberly mine. This was followed by Mrs. Hannaford answering questions from the floor.

The Society accorded Mrs. Hannaford a rising vote of thanks for a truly fine presentation.

FEBRUARY MEETING

The Society held its meeting on the third day of the month at which time Mr. W. Helbig and Mr. P. Thein presented a most instructive lecture and demonstration of the importance and value of optics in mineral determination.

Mr. Helbig covered the primary phases of optical determination by explaining in detail the behavior of light in the study of opaque and transparent thin sections under the polarized microscope. Isotropic and anisotropic refraction of light as well as refractive index was discussed and clarified with charts and

drawings. The importance of orientation effect on color, and interference colors, the construction of the nicol prism and how it functioned was graphically illustrated.

Mr. Thein projected a great many of his excellent thin sections, using the fine polarized projecting microscope he has constructed.

A rising vote of thanks by the members was accorded Mr. Helbig and Mr. Thein to conclude an evening that will long be remembered by us.

Wm. Stadler, Sec.
153-08 119th Ave.
Jamaica, L. I., N. Y.

San Jose Lapidary Society

Variety and beauty of gem stones will be the featured attraction at the fourth annual gem show of the San Jose Lapidary Society, which will be shown in the San Jose Womens Club Auditorium, 75 South Eleventh Street, San Jose, California, on April 23rd. and 24th, 1949.

The Society has now completed its own show cases and will present a more elaborate show than in previous years. For months the seventy-five members of the Society have been industriously engaged in transforming rough material, from almost every important gem locality in the world, into exquisite gem stones and jewelry.

The transparencies, which received much favorable comment last year, will be even more attractively displayed on a new frame which stands seven feet high and is sixteen feet long. Stones, which are transparent and contain colored markings, have been sliced thin and mounted on this frame in such a way that a transmitted light will emphasize their natural color and markings.

Approximately ten thousand pieces, representing more than one hundred varieties of material, will be shown as spheres, flats, cabochon cuts and faceted stones. Novelties such as lamp bases, book ends, ash trays and pen stands will be prominently displayed. Also on display will be several new cameos. These portraits are carved on shell from the Indian Ocean and represent many hours of tedious and painstaking work.

None of the jewelry, novelties or stones is for sale.

The exhibit will be open to the public from 10:00 A.M. to 9:00 P.M. each day.

Admission is free.

The Newark Mineralogical Society

The 260th regular meeting of the Newark Mineralogical Society was held Sunday, December 5th, 1948, at 3 P.M. in the Newark Museum. The program for the afternoon was a lecture by Mr. Paul Seel of Bala-Cynwyd, Pa., illustrated with Kodachrome slides, on "Down the San Juan and Colorado Rivers".

Mr. Seel's western trip was a planned summer vacation venture by boat from Mexican Hat to almost the Boulder Dam along the canyons of the San Juan and Colorado Rivers. Mr. Seel, being both a mineralogist and geologist, described the rock formations of the canyons and the natural wonders, in detail, and brought out many personal experiences and dangers, even to the wearing of a red hat. The Kodachrome slide lantern pictures were beyond description in color and scenic beauty and Mr. Seel was assisted by his friend, Mr. Leonard Morgan, who is a member of our Society.

Herman E. Grote
Publicity Chairman
95 Lenox Street,
Newark 6, N. J.

The 261st meeting of the Newark Mineralogical Society was held at the Newark Museum on Sunday, January 9th.

Mr. C. P. W. Crowell, Jr., a representative of the American Airlines, showed a technicolor film entitled "Arizona Sun", which depicted the various attractions of a winter vacation in the Southwest. To the rockhounds, of course the rugged terrain was the subject of much speculation as to mineral content. and pictures of turquoise studded saddles, and beautiful Indian jewelry brought forth appreciative murmers from the members.

Mineral collecting appetites were further whetted by a most attractive display of Arizona minerals from the personal collection of several of the members. A beautiful copper specimen from Bisbee, Arizona, was shown by Mr. Louis Reamer. Mr. Leonard Morgan, of Burlington, N. J. showed several interesting specimens, among which were the rounded partially clear pieces of matrix-embedded obsidian called "Apache Tears."

There were several specimens of Azurite, fluorescent Calcite, Chrysocolla, and vanadinite all beautiful and colorful, and for the gem cutters in the audience there was a display of brilliant turquoise Cabochons of varied sizes from the collection of Mr. Herman E. Grote.

Dorothy E. Webb
(for the Publicity Committee)
196 Magnolia Ave.
Arlington, N. J.

Central Iowa Mineral Society

At the Dec. 3, 1948, meeting the Society had as its guest, Mrs. Vernon Seeburger, who spoke on the seismograph. Mrs. Seeburger is a well known local person who has operated her station in her home for several years. She knew her subject very well and with the aid of charts and graphs, presented her topic to our group in a very understandable fashion.

The January and February meetings were presented by John Sanders. His program was a brief but thorough course in mineral identification—a subject very interesting to all our members.

(Continued on Page 171)

BIBLIOGRAPHICAL NOTES

Minerals of California: By Joseph Murdoch

A completely revised and much enlarged edition of Bulletin 113 has recently made its appearance as Bulletin 136. The new edition includes 516 mineral species, a bibliography of 2,000 titles, 402 pages of text, and historical and geological sketches of California's most famous mineral localities. Four full-page colored plates and a map of Mojave Sink region and turquoise mines are special features of the revised edition. The minerals are arranged in alphabetical order for simplicity.

Issued by the California Division of Mines, Ferry Building, San Francisco 11, Calif. — Price $3.00.

Geologic Guidebook along Highway 49 — Sierran Gold Belt: Prepared under the direction of Olaf P. Jenkins.

This guidebook, a centennial edition of the Mother Lode Country of California, is an unusually fine and interesting publication. It contains 164 pages, is profusely illustrated (frontispiece in color), and has been issued to commemorate the discovery of gold in California in 1849.

Issued by the California Division of Mines, Ferry Building, San Francisco 11, Calif., as Bulletin 141. Price $1.00.

Iron Resources of California: Prepared under the direction of Olaf. P. Jenkins.

This is a complete bulletin on the iron resources of California; its 16 individual articles have been contributed by various authorities.

The bulletin contains 304 papers, 25 plates, 68 figures, and has been issued by the California Division of Mines, Ferry Building, San Francisco 11, Calif., as bulletin 129. Price not quoted.

Handbook of Uranium Minerals: By Jack De Ment and H. C. Dake.

This is the 2nd edition, completely re-written and enlarged, of this very popular book. It is a practical guide for those who wish to prospect for uranium deposits and for testing uranium minerals. Dr. Dake, the co-author, is Editor of *The Mineralogist*, one of the country's most popular mineral magazines.

This 96-page, illustrated book, is issued by the Mineralogist Publishing Co., 329 S. E. 32nd Ave., Portland 15, Ore. Price $2.00.

Nature as a Sculptor: By Richard M. Pearl.

A revised edition of this popular little book was recently issued. It has been written for visitors to Colorado and residents within the state who want to know how the scenery "happened'. It contains 48 pages and is nicely illustrated.

Issued by the Denver Museum of Natural History, Denver, Colo.

Commercial granites and other crystalline Rocks of Virginia: By Edward Steidtmann:

152 pages, 10 plates, 23 figures—Bulletin 64.

Industrial limestones and dolomites in Virginia:

195 pages, 19 plates, 5 figures—Bulletin 65.

These two publications have recently been issued by the Virginia Geological Survey, Charlottesville, Va.

Oversikt over Norges Mineraler: By Ivar Oftedal.

The aim of this publication is to give a complete list of the mineral species so far known to occur in Norway. The text is all in Norwegian (1 page in English) but many of the mineral names so closely resemble English names that their identification is easy.

This 48-page bulletin (No. 170) has been issued by the Norges Geologiske Undersokelse, Oslo, Norway.

Statistics on the Mining in Greece: By Aristotle Tsakonas.

This is a 74-page publication printed chiefly in Greek and French (1 page in English).

Issued by the Bureau of Mines, Ministry of National Economy, Athens, Greece.

Historical Gology: By Carl O. Dunbar.

This book, replacing *Textbook of Geology, Part II, Historical Geology*, by the late Charles Schuchert and Carl O. Dunbar, retains the objective of the earlier book—to interest the reader and appeal to his imagination and understanding as it surveys the past history of our planet and of life on Earth.

This most interesting history of the Earth "from the fiery birth of the planet to the dawn of recent time" is divided into 5 parts as follows: 1. Prologue (contains 4 chapters); 2. Before the Cambrian (2 chapters); 3. The Paleozoic World (7 chapters); 4. The Mesozoic World (3 chapters); and 5. The Modern World Unfolds (4 chapters). An Epilogue, Appendix, and Index, round out the rest of the book.

Historical Geology is printed in large type and beautifully illustrated. It contains 567 pages, 350 illustrations, and sells for $5.00 a copy.

Published by John Wiley & Sons, Inc., 440-4th Ave., New York 16, N. Y.

Central Iowa Mineral Society

(Continued from Page 170)

The Central Iowa Mineral Society changed its name slightly, from Club to Society, at the January meeting.

We are now at work on a bulletin and hope to present it in the near future.

Mrs. R. G. Hays, Sec.,
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